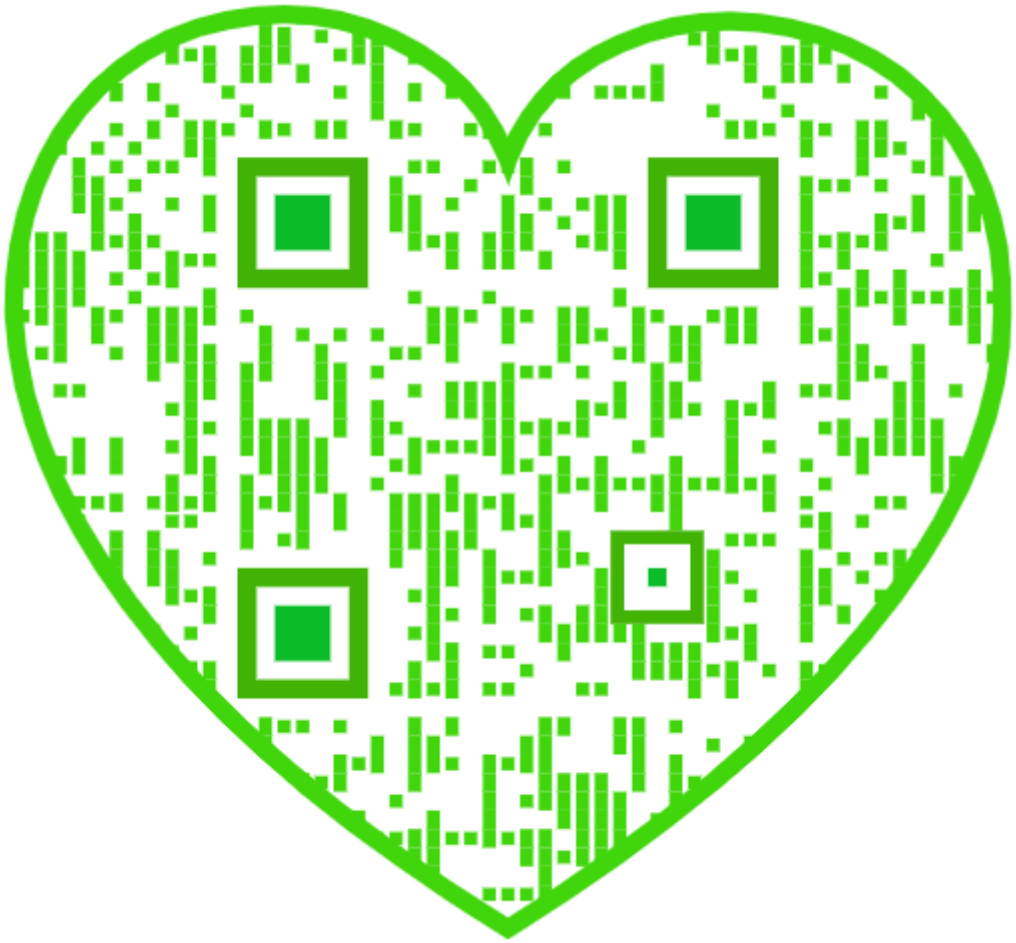

UNITED STATES DEPARTMENT OF AGRICULTURE

BULLETIN No. 175

Contribution from the Bureau of Plant Industry
WM. A. TAYLOR, Chief

Washington, D. C. ▼ April 29, 1915

MUSHROOMS AND OTHER COMMON FUNGI

By

FLORA W. PATTERSON, Mycologist, and VERA K. CHARLES
Assistant Mycologist, Office of Pathological Collections
and Inspection Work

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INTRODUCTION.

The desirability of a Government publication for free distribution by the aid of which the amateur collector may distinguish poisonous and edible species of fungi is suggested by the present-day tendency to popularize science, the increased general interest in nature-study subjects, and the special interest manifested in the subject of mushrooms.

The writers make no claim to originality or to the contribution of new and interesting observations on the subject of mycology, but if this bulletin furnishes the amateur collector or nature student with a means of identifying certain common species and differentiating poisonous and edible varieties its purpose will be attained.

The keys to aid in locating the genus or species are only intended and applicable for use with the species described. Questions of relationship are sometimes necessarily sacrificed for the sake of rendering identifications easier for the amateur.

There has been no effort to include the descriptions of a large number of species, but a few have been selected from each of the most familiar genera. The descriptions are brief and plainly written, the object being to mention the salient features or the distinctive characters of a particular fungus and to avoid as far as possible the

use of technical terms or statements which would require for verification the assistance of a compound microscope. By referring to the appended glossary and with the aid of a hand lens, the amateur collector can expect to recognize a large number of the fungi described in these pages.

For some years certain foreign Governments have been endeavoring to teach their citizens the food value of mushrooms. All over France, but especially in Paris, exhibits are given of desirable species. In Rouen during the season, daily lectures, illustrated by many fresh specimens, are prepared for the benefit of the country residents. In the elementary schools of Saxony systematic instruction is given to families and children, and a permanent exhibit of specimens is also maintained.

To judge from the statements of early authors, for many centuries wild mushrooms have been eagerly collected and eaten, especially in Germany, France, and Italy. Perhaps the only recorded voice of absolute protest came from the ancient Hindus, who considered those who ate mushrooms, "whether springing from the ground or growing on a tree, fully equal in guilt to the slayers of Brahmins." Although early history records the use of mushrooms and the high esteem in which they were held by the ancients, it is true that their nutritive value has been greatly exaggerated and is not high and that they are not as life sustaining as meat, in spite of the frequent assertions of enthusiastic mycophagists to the contrary.

The mushroom most commonly grown and employed for canning is *Agaricus campestris*, but not all canned mushrooms are of the cultivated variety. In France there has been established a large business in preserving wild species in that manner, and they have for some time been for sale here. Tons of dried wild mushrooms are also imported from China.

Too emphatic a statement can not be made as to the absolute impossibility of "telling the difference between mushrooms and toadstools" by any of the so-called "tests."

The only way to discriminate between edible and injurious fungi is by studying each species from a botanical point of view. By paying strict attention to certain constant features, as pointed out by an expert, the acquaintance of several species may readily be acquired during each season. It is well to look with suspicion upon every mushroom which is not positively known to be edible. The absolute necessity of eating mushrooms when perfectly fresh can not be too strongly emphasized.

In collecting mushrooms the plants should not be pulled from the ground by the stem, but they should be lifted out of the earth by the aid of a knife or pointed stick. By this means the form of the base of the stem, a feature of great importance in specific identification,

can be determined and the presence or absence of a volva demonstrated. Careful notes of prominent features should always be made at the immediate time of collection, as some characters are extremely transient. If the opinion of an expert is required, such notes should accompany the specimens. If possible, several of each species should be collected in order to show variation. The plants should be separately wrapped in paper, paraffin preferred (not tissue or raw cotton), and all placed in a wooden box if to be sent by mail.

MORPHOLOGICAL STRUCTURE OF MUSHROOMS AND CERTAIN OTHER FUNGI.

The parts common to most mushrooms and certain other fungi are the cap and the stem. The cap, or pileus, is the apical, fleshy part which on its lower surface bears gills in Agaricaceæ, pores in Polyporaceæ, and teeth in Hydnaceæ. The stem, or stipe, is present in many genera and is normally central; but it may be abbreviated or wholly absent, in which case the plant is said to be sessile, or resupinate if attached by the back, and the attachment may be excentric (not centrally attached) or lateral. The shape of the cap is described as umbilicate when it has a central depression, infundibuliform when funnel shaped, and umbonate when it has a central elevation. The margin may be involute (rolled in) or revolute (rolled out), repand (wavy), etc.

The spores, the microscopic bodies analogous to seeds, are developed from the hymenium or spore-bearing tissue, which covers the surface of the gills in Agaricaceæ, covers the teeth in Hydnaceæ, and lines the pores in Polyporaceæ.

The gills, or lamellæ, are the thin, bladelike, radiating structures borne on the lower surface of the cap. Their color is generally determined by the color of the spores. The method of attachment to the stem is various, and they are described as adnate when attached squarely to the stem, adnexed when reaching the stem but not attached by the entire width, free when not reaching the stem, sinuate or emarginate when notched or curved at the junction with the stem, and decurrent when extending down the stem. The gills are said to be attenuate when their ends are narrowed to a sharp point, acute when they terminate in a sharp angle, obtuse when the ends are rounded, arcuate when arched, and ventricose when broadened at the middle.

In the early stages of development the margin of the cap lies against the stipe. In certain genera, as Amanita, Lepiota, Agaricus, and others, a thin veil is present, uniting the margin of the cap and the stem. This structure, known as the veil, consists of fibers growing from the margin of the cap and the outer layers of the stem. It, or a portion of it, may persist as a firm movable or nonmovable annulus (ring), as in the genus Lepiota, or in the form of remnants

attached to the margin of the cap, as present in *Hypholoma appendiculatum.*

The volva, or universal veil, is the term applied to the membranous envelope which in some genera entirely incloses the cap and stem. In certain species it ruptures at maturity, leaving a cup-shaped base, while often a portion adheres to the pileus in the form of warts or scales.

DESCRIPTIONS OF SPECIES.

In this paper the general plan has been to give a description of the class or family, then a key to assist in the identification of the species herein discussed, and lastly descriptions of the individual genera or species. Descriptions of the following species will be found on the pages indicated.

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AGARICACEÆ.

The classification for the genera of Agaricaceæ discussed in this bulletin is based upon the color of the spores. It is generally a comparatively easy matter to form an opinion regarding the color of the spores, but if any difficulty is experienced a spore print may be made. The process is very simple, and the results are quite satisfactory. The stem is removed from the specimen from which a print is desired and the cap placed face down on a piece of paper of contrasting color, covering it with a tumbler. When the spores are mature they will fall in radiating lines on the paper. If a permanent spore print is desired, an alcoholic spray of white shellac may be employed. This is prepared by making a saturated solution of white shellac and then diluting it 50 per cent with alcohol.

Key to Agaricaceæ.

WHITE-SPORED AGARICS.

Plants soft or more or less fleshy, soon decaying, not reviving well when moistened:
- Ring or volva or both present—
  - Volva and ring both present.....AMANITA.
  - Volva present, ring absent.....AMANITOPSIS.
  - Volva absent, ring present—
    - Gills free from stem.....LEPIOTA.
    - Gills attached to the stem.....ARMILLARIA.
- Ring and volva both absent—
  - Stem excentric or lateral.....PLEUROTUS.
  - Stem central—
    - Gills decurrent—
      - Edge blunt, foldlike, forked.....CANTHARELLUS.
      - Edge thin, stem fibrous outside.....CLITOCYBE.
      - Edge thin, stem cartilaginous outside.....OMPHALIA.
    - Gills sinuate, general structure fleshy.....TRICHOLOMA.
    - Gills adnate[1] or adnexed—
      - Cap rather fleshy, margin incurved when young...COLLYBIA.

[1] See the Glossary, pp. 56 to 58, for definitions of the technical terms.

Plants soft or more or less fleshy, etc.—Continued.
Ring and volva both absent—Continued.
Stem central—Continued.
Gills adnate or adnexed—Continued.
Cap thin, margin of the cap at first straight, mostly bell shaped.....MYCENA.
Cap fleshy, gills very rigid and brittle, stem stout—
Milk present.....LACTARIUS.
Milk absent.....RUSSULA.
Gills various, often decurrent, adnate or only adnexed, edge thin, thick at junction of cap, usually distant, waxy.....HYGROPHORUS.
Plants coriaceous, tough, fleshy or membranaceous, reviving when moistened:
Stem generally central, substance of the cap noncontinuous with that of the stem, gills thin, often connected by veins or ridges..MARASMIUS.
Stem central, excentric, lateral, or absent, substance of the cap continuous with that of the stem—
Edge of gills toothed or serrate.....LENTINUS.
Edge of gills not toothed or serrate.....PANUS.
Edge of gills split into two laminæ and revolute.....SCHIZOPHYLLUM.
Plants corky or woody, gills radiating.....LENZITES.

ROSY-SPORED AGARICS.

Stem excentric or absent and pileus lateral .....CLAUDOPUS.
Stem central:
Volva present, annulus wanting.....VOLVARIA.
Volva and annulus absent—
Cap easily separating from the stem, gills free.....PLUTEUS.
Cap confluent with the stem, gills sinuate.....ENTOLOMA.

OCHER-SPORED AGARICS (SPORES YELLOW OR BROWN).

Gills easily separable from the flesh of the cap:
Margin of the cap incurved, gills more or less decurrent forked or connected with veinlike reticulations.....PAXILLUS.
Gills not easily separable from the flesh of the cap:
Universal veil present, arachnoid.....CORTINARIUS.
Universal veil absent—
Ring present.....PHOLIOTA.
Ring absent—
Stem central—
Cap turned in.....NAUCORIA.
Cap not turned in.....GALERA.
Stem excentric or none.....CREPIDOTUS.

BROWN-SPORED AGARICS.

Cap easily separating from the stem, gills usually free.....AGARICUS.
Cap not easily separating from the stem, gills attached:
Ring present.....STROPHARIA.
Ring absent, veil remaining attached to the margin of the cap..HYPHOLOMA.

BLACK-SPORED AGARICS.

Gills deliquescing, cap thin, ring present in some species.....COPRINUS.
Gills not deliquescing:
Margin of cap striate, gills not variegated.....PSATHYRELLA.
Margin of cap not striate, gills variegated.....PANAEOLUS.

AMANITA.

The genus Amanita is easily recognized among the white-spored agarics in typical species or early stages by the presence of a volva and a veil. Young plants are completely enveloped by the volva, and the manner in which it ruptures varies according to the species. The volva may persist in the form of a basal cup, as rings or scales on a bulblike base, or it may be friable and evanescent. The cap is fleshy, convex, then expanded. The gills are free from the stem, which is different in substance from the cap and readily separable from it.

This is a most interesting genus, on account of the great beauty of color and texture of many of its species and the fact that it contains the most poisonous of all mushrooms. While there are some edible species in the genus, the safest policy for the amateur is to avoid all mushrooms of the genus Amanita.

Amanita caesarea. Cæsar's mushroom.

Cap ovate to hemispherical, smooth, with prominently striate margin, reddish or orange becoming yellow; **gills** free, yellow; **stem** cylindrical, only slightly enlarged at the base, attenuated upward, flocculose, scaly below the annulus, smooth above; **ring** membranaceous, large, attached from its upper margin; **stem** and **ring** normally orange or yellowish, in small or depauperate specimens sometimes white; **flesh** white, yellow under the skin, and usually yellow next to the gills; **volva** large, distinct, white, saclike.

Cap 2½ to 4 or more inches broad; stem 3 to 5 inches long. (Pl. I, fig. 1.)

This species is variously known as Cæsar's agaric, royal agaric, orange Amanita, etc. It has been highly esteemed as an article of diet since the time of the early Greeks. It is particularly abundant during rainy weather and may occur solitary, several together, or in definite rings. Although this species is edible, great caution should always be used in order not to confound it with *Amanita frostiana*, which is poisonous. The points of difference of these two species are conveniently compared as follows:

Species.	Cap.	Gills.	Stem.	Volva.
Amanita caesarea..	Orange, smooth, occasionally with a few fragments of volva as patches.	Yellow.....	Yellow.....	White, sometimes breaking up into soft, fluffy masses.
Amanita frostiana.	Yellow, smooth or with yellowish scales.	Yellow or tinged with yellow.	White or yellow...	Yellow, sometimes breaking up into fluffy, yellow fragments.

Amanita muscaria. The fly Amanita. (Very poisonous.)

Cap globose, convex, and at length flattened, at maturity margin sometimes slightly striate; **flesh** white, sometimes yellow under the pellicle; remnants of the **volva** persisting as scattered, floccose, or rather compact scales, color subject to great variation, ranging from yellow to orange, or blood red, **gills** white or yellowish, free but reaching the stem; **stem** cylindrical, at first stuffed, later hollow, upper part torn into loose scales, bulb prominent, generally marked by concentric scales forming irregular ridges; **ring** typically apical, lacerated, lax, large.

Cap 3½ to 5½ inches broad, stem 4 to 6 inches long. (Pl. I, fig. 3; from V. K. Chesnut.)

Amanita muscaria may be found during the summer and fall, occurring singly, or in small associations, or in patches of considerable size. It grows in cultivated soil, partially cleared land, and in woods or roadsides. It does not demand a rich soil, but rather exhibits a preference for poor ground. The color is an exceedingly variable character, the plants being brighter colored when young and fading as they mature. The European plant possesses more gorgeous colors than the American form.

This is a very poisonous species, and it has been the subject of many pharmacological and chemical investigations. Its chief poisonous principle is muscarine, although a second poisonous element is believed to be present, as atropine does not entirely neutralize the effect of injections of *Amanita muscaria* in animals.

This species has been responsible for many deaths, and numerous cases of severe illness have been caused by persons mistaking *Amanita muscaria*, the poisonous species, for *Amanita caesarea*, the edible species. While typical specimens of these two species possess distinguishing characters, as already shown, it is again recommended to shun all Amanitæ.

In Siberian Russia the natives make several uses of *Amanita muscaria*. Preserved in salt it is eaten, though probably more as a condiment than as a main article of diet; a decoction is popular as an intoxicant, and deaths are reported upon good authority as resulting from a "muscaria orgy."

Amanita phalloides. Death cup. (Deadly poisonous.)

Cap white, lemon, or olive to umber, fleshy, viscid when moist, smooth or with patches or scales, broadly oval, bell shaped, convex, and finally expanded, old specimens sometimes depressed by the elevation of the margin; **gills** free, white; **stem** generally smooth and white, in dark varieties colored like the cap but lighter, solid downward, bulbous, hollow, and attenuated upward; **ring** superior, reflexed, generally entire, white.

The large, free **volva**, its lower portion closely adherent to the bulb, and the large ring are of assistance in distinguishing this species.

Cap 3 to 4 inches broad; stem 3 to 5 inches long. (Pl. I, fig. 2.)

This species and its forms are subject to great variation in color, ranging from white, pale yellow, and olive to brown. *Amanita phalloides* is a very cosmopolitan plant and one of very common occurrence. It is the most dangerous of all mushrooms, for no antidote to overcome its deadly effect is known. It exhibits no special preference as regards habitat and is found growing in woods or cultivated land from summer to late autumn. When fresh it is without scent, but a peculiarly sickening odor is present in drying plants.

Amanita rubescens.

Cap oval to convex, nearly expanded when old, covered with numerous, unequal, thin, floccose, grayish scales, which are noticeably persistent in dry weather, surface smooth or very faintly striate; **stem** cylindrical, tapering above, bulb prominent, suffused reddish; **ring** membranaceous, large, fragile; **volva** persisting as floccose scales on the cap or present as loose fragments on the bulb.

Cap 4 to 5 inches broad; stem 4 to 5 inches long, about 1 inch thick. (Pl. II, fig. 4.)

This species occurs quite abundantly in the late summer or early fall. It is often found in patches, but it may also appear singly. The European form is sometimes regarded as poisonous, but the American form of *Amanita rubescens* is considered edible. Again the advice to the amateur is to avoid all Amanitae. Dr. W. W. Ford, of Johns Hopkins Hospital, who conducted extensive experiments concerning the poisonous principle in certain Amanitae, states that the American form of this species is not poisonous to man.

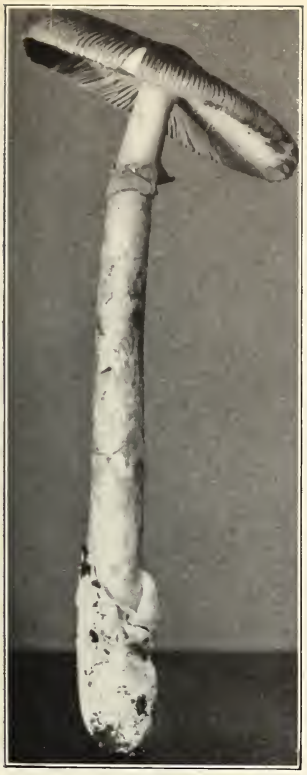

FIG. 1.—AMANITA CAESAREA.

FIG. 2.—AMANITA PHALLOIDES. (POISONOUS.)

FIG. 3.—AMANITA MUSCARIA. (POISONOUS.)

FIG. 1.—AMANITA SOLITARIA.

FIG. 2.—GALERA TENERA. (EDIBLE.)

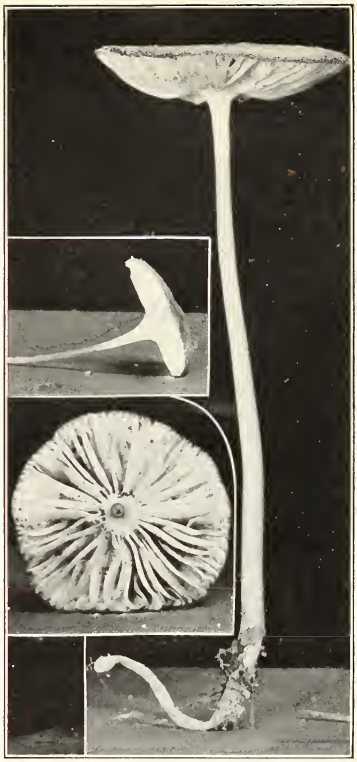

FIG. 3.—COLLYBIA RADICATA. (EDIBLE.)

FIG. 4.—AMANITA RUBESCENS.

FIG. 1.—AMANITOPSIS VAGINATA. (EDIBLE.)

FIG. 2.—AMANITA STROBILIFORMIS.

FIG. 1.—LEPIOTA AMERICANA. (EDIBLE.)

FIG. 2.—CORTINARIUS VIOLACEUS. (EDIBLE.)

FIG. 1.—LEPIOTA MORGANI. (POISONOUS.)

FIG. 2.—LEPIOTA NAUCINA. (EDIBLE.)

LEPIOTA PROCERA. (EDIBLE.)

FIG. 1.—PLEUROTUS OSTREATUS. (EDIBLE.)

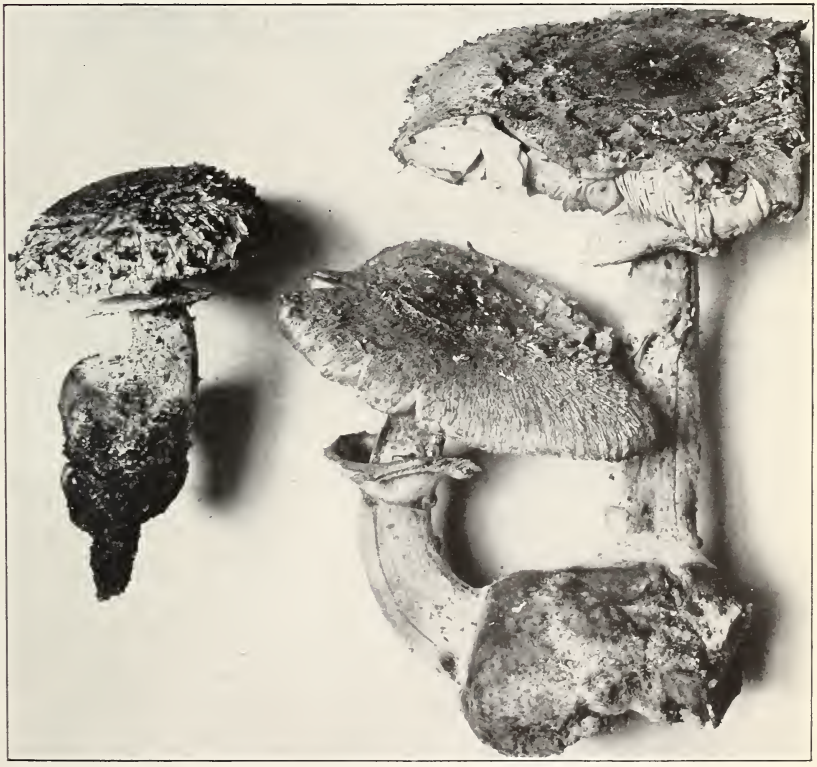

FIG. 2.—LEPIOTA RACHODES. (EDIBLE.)

FIG. 1.—ARMILLARIA MELLEA. (EDIBLE.)

FIG. 2.—CLITOCYBE MONADELPHA. (EDIBLE.)

Amanita solitaria.

Cap when young hemispherical, later convex to expanded, margin even, somewhat elevated when old, scales flaky or floccose and of a sticky, farinaceous character, easily rubbed off, chalky white; **gills** white or cream, free or attached by only the upper inner angle; **stem** when young mealy or scaly, equal, solid or stuffed, with a bulb of the same character which prolonged into a rootlike process penetrates into the soil a considerable distance; **ring** torn, often adhering as fragments to the margin of the cap and gills; **volva** breaking up into scales which finally disappear.

Cap 3 to 6 inches broad; stem 4 to 6 inches long, one-half to 1 inch thick. (Pl. II, fig. 1.)

A comparative discussion of this species is to be found under *Amanita strobiliformis.*

Amanita strobiliformis.

Cap convex or nearly plane, white, sometimes cinereous or yellowish on the disk, with large angular, pyramidal warts, which are adnate and mostly persistent; margin extending slightly beyond the gills, sometimes bearing fragments of the **ring,** which is large and lacerated; **gills** broad, rounded behind, whitish; **stem** thick, equal or tapering above, solid, floccose scaly, white, bulb very large with concentric-marginate ridges and corresponding furrows, somewhat pointed below.

Cap 3 to 10 inches broad; stem 3 to 8 inches long, 1 to 2 inches thick. (Pl. III, fig. 2.)

There is some uncertainty as to the identity of *Amanita strobiliformis* and *A. solitaria* as they occur in America, but as this bulletin has for its object the popular treatment of the subject, the desire is to call attention to the differences of *Amanita solitaria* and *A. strobiliformis* as generally recognized by the collector and not their systematic position as determined by mycologists. *Amanita solitaria* does not always occur solitary, as its name suggests, but is more readily separated from *A. strobiliformis* by its long rooting base and conic scales than by its method of growth. While these differences are present in typical specimens, it must be remembered that many intermediate forms may occur, thus making the separation of the two species extremely difficult.

Amanita verna. Destroying angel.

Cap white, smooth, viscid when moist, convex then expanded, margin even; **gills** free and white; **stem** stuffed, or hollow in age, bulbous, sheathed at the base by the membranous volva; **ring** reflexed, forming a wide collar.

By most authorities *Amanita verna* is considered a mere form of *A. phalloides,* as it has no constant morphological characters and is only separated by the pure white color and its generally more slender form. Because of its exceedingly poisonous nature it is popularly known as the "destroying angel."

AMANITOPSIS.

By some mycologists Amanitopsis is considered a subgenus of Amanita, from which, however, it differs in the absence of a veil and a ring. The volva is ample and persistent, and the gills are completely free from the stem, which is readily separable from the cap. Great care must be observed in collecting species of this genus for food in order not to collect specimens of Amanita from which the ring has disappeared.

Amanitopsis farinosa. (Edible.)

Cap gray or grayish brown, convex, becoming almost plane or depressed in the center, thin with deeply striate margin, nearly covered with a grayish powder which is readily rubbed off; **gills** whitish, free; **stem** hollow or stuffed, whitish, enlarged at base, subbulbous, with flocculent, pulverulent **volva** which may soon disappear.

Cap 1 to 1¼ inches broad; stem 1 to 2 inches long, 2 to 3 lines thick.

This is an interesting little species of rather infrequent occurrence. The farinose, or mealy, character of the cap is the most striking specific feature. It appears bordering roadsides or in open woods during the summer and early fall months.

Amanitopsis vaginata. (Edible.)

Cap thin and fragile, ovate to bell shaped, or expanded, sometimes umbonate, gray, mouse colored, or brown, smooth, shining, margin deeply striate; **gills** white, free; **stem** smooth or mealy, hollow or stuffed, not bulbous, tapering above; **volva** conspicuous, soft, sheathing but free, often remaining in the ground, being easily separable from the stem.

Cap 1¾ to 4 inches broad; stem 3½ to 7 inches long. (Pl. III, fig. 1; from G. F. Atkinson.)

This is a very common and widely distributed species, occurring from the Pacific to the Atlantic. It is remarkable for great variation in size and color, ranging from 2 to 10 inches broad and varying from gray or umber to tawny. Because of these variations some authorities recognize several varieties.

Amanitopsis vaginata grows in woods, shaded situations, or lawns. It is considered an excellent edible species, but is too easily confused with an Amanita to be recommended for an article of diet.

LEPIOTA.

The genus Lepiota may be distinguished from Amanita and Amanitopsis by the presence of a ring and the absence of a volva. The cap is generally scaly or granular, and the stem is fleshy and easily separable from the cap, in which it leaves a cuplike depression. The gills are usually free and are white when young, but certain species are pink or green when mature. The ring may be fixed or free, and when the plant is young it is readily seen, but before maturity it may have disappeared. The genus contains some of the finest edible species as well as some extremely dangerous ones.

Lepiota americana. (Edible.)

Cap ovate, then convex, expanded, umbonate, the umbo and scales reddish brown; **flesh** white, becoming reddish if cut or bruised; **gills** white, ventricose, close, free; **stem** white, hollow, smooth, swollen near the base; **ring** rather large and delicate, and consequently it may disappear in old age.

Cap 2 to 4 inches broad; stem 2 to 4 inches long, 3 to 5 lines thick. (Pl. IV, fig. 1.)

This mushroom is of wide geographic distribution and grows singly or in clusters, often at the base of stumps, sometimes on sawdust piles, and again on grassy lawns. The plants are white when young, with the exception of the umbo and the scales, but in drying become smoky red. Sometimes they are erect, but frequently more or less ascending. *Lepiota americana* may be easily recognized by the peculiarity of turning red when bruised or old.

Lepiota morgani. Green gill. (Poisonous.)

Cap fleshy, globose when young, expanded to plane or slightly depressed, not umbonate, white with a yellowish or brownish cuticle, which breaks up into scales except in the center; **flesh** white, changing to reddish or yellowish on being cut or bruised; **gills** close, lanceolate, remote, white becoming green; **stem** firm, smooth, hollow, subbulbous, tapering upward, white with brownish tinge; **ring** large, movable.

Cap 5 to 9 or even 12 inches broad; stem 6 to 9 inches long, 4 to 8 lines thick. (Pl. V, fig. 1.)

Great care should be taken to avoid this species. Many instances of poisoning are well substantiated, and extreme inconvenience and serious illness have resulted from eating very small pieces of the uncooked mushroom. The gills are slow in assuming the green tinge characteristic of this species, but after being allowed to remain in ordinary room temperature the color is quite noticeable. This fungus occurs mostly on grassy places, such as lawns and parks, during the summer months, frequently forming large "fairy rings."

Lepiota naucina. Smooth Lepiota.

Cap smooth, rarely minutely scaly, white or smoky, almost globose when young, then convex, expanding, and becoming somewhat gibbous; **flesh** white; **gills** free from the stem, crowded, white, becoming smoky pink when old; **stem** rather stout, enlarged below, nearly hollow or loosely stuffed; **ring** adhering to the stem.

Cap 1½ to 3 inches broad; stem 2 to 3 inches long, 4 to 8 lines thick. (Pl. V, fig. 2; from C. G. Lloyd.)

Prof. Peck describes and discusses a form closely allied to *Lepiota naucina* which he calls *L. naucinoides*, the differences consisting in the smoother cap and the shape of the spores. This latter character, being a microscopic feature, is of no practical assistance to the amateur. These two forms are both edible, but extreme caution must be used in order not to collect poisonous or deadly white Amanitae for specimens of Lepiota before the pink tinge of the gills is apparent.

Lepiota procera. Parasol mushroom. (Edible.)

Cap ovate, then expanded with a distinct, smooth, brown umbo, cuticle early breaking up into brown scales showing the white flesh; **gills** broad, crowded, white, free, and distant from the stem; **stem** tubular, long, bulbous, generally scaly or spotted, its substance distinct and free from the cap, in which a cavity is left by its removal; **ring** large and thick, readily movable when old.

Cap 3 to 6 inches broad; stem 5 to 12 inches long, about 6 lines thick. (Pl. VI; from C. G. Lloyd.)

This very attractive and graceful species may be collected in pastures, lawns, gardens, thin woods, or roadsides. It occurs singly or scattered, appearing during summer and early fall, and is considered an excellent edible species.

Lepiota rachodes. (Edible.)

Cap fleshy, fragile when mature, globose, expanded or depressed, not umbonate, at first covered with a rigid, continuous, bay-brown cuticle, which remains entire at the center, elsewhere reticulated with cracks or separated into loose scales; **flesh** white, quickly changing to saffron red upon being cut or broken; **gills** white, crowded, broad in the center and narrowing toward each end, distant from the stem; **stem** stout, whitish, hollow, smooth in young plant, bulbous; **ring** thick, movable, with scales on the under side.

Cap 2 to 5 inches broad; stem 2 to 4 inches long, about 5 lines thick. (Pl. VII, fig. 2; from C. G. Lloyd.)

This species is closely related to *Lepiota procera*, of which it is sometimes considered only a variety. It differs in its stouter habit, absence of an umbo, and in the changeable flesh, which becomes tinged with red when broken.

ARMILLARIA.

The genus Armillaria is another white-spored agaric having a ring and no volva. The gills are attached to the stem and are sinuate or more or less decurrent. The substance of the stem and cap is continuous and firm. This genus may be distinguished from Amanita

and Lepiota by the continuity of the substance of the stem and cap, and it is further differentiated from Amanita by the absence of a volva. It contains several edible species.

Armillaria mellea. Honey-colored mushroom. (Edible.)

Cap oval to convex and expanded, sometimes with a slight elevation, smooth, or adorned with pointed dark-brown or blackish scales, especially in the center, honey color to dull reddish brown, margin even or somewhat striate when old; **gills** adnate or decurrent, white or whitish, sometimes with reddish brown spots; **stem** elastic, spongy, sometimes hollow, smooth or scaly, generally whitish, sometimes gray or yellow above the ring, below reddish brown.

Cap 1½ to 6 inches broad; stem 2 to 6 inches long, one-half to three-fourths inch thick. (Pl. VIII, fig. 1; from W. A. Kellerman.)

This species is extremely common and variable. It generally occurs in clusters about the base of rotten stumps and is often a serious parasite of fruit trees. Both ring and stem are subject to marked variations. The former may be thick, or thin, or entirely absent, and the latter uniform in diameter or bulbous. The species is edible, though not especially tender or highly flavored.

On account of the great variation in color, surface of the cap, and shape of the stem, several forms of *Armillaria mellea* have been given varietal distinction. The following varieties as distinguished by Prof. Peck may be of assistance to the amateur:

Armillaria mellea var. *flava*, with yellow or reddish yellow cap.
Armillaria mellea var. *radicata*, with a tapering root.
Armillaria mellea var. *albida*, with white or whitish cap.

Armillaria nardosmia. (Edible.)

Cap fleshy, firm and thick at the center, thin toward the margin, whitish with brown spots, cuticle becoming squamulose; **flesh** white; **gills** whitish, crowded, slightly emarginate; **stem** stout, fibrous, sheathed by the brown velvety veil.

Cap about 3 inches broad; stem 1½ to 2½ inches long.

This plant resembles a short-stemmed Lepiota, but is more robust than species of that genus. It is found on the ground in woods, especially in the sandy soil of conifers. Its strong taste and smell of almonds disappear in cooking.

Armillaria ventricosa.

Cap fleshy, convex or nearly plane, smooth, shining white, margin thin and involute; **flesh** whitish; **gills** narrow and close, decurrent, sometimes dentate or denticulate on the edge, whitish; **stem** thick and short, ventricose, abruptly pointed at the base; **ring** lacerated and membranaceous.

Cap 4 to 7 inches broad; stem 2 to 3 inches long, ventricose portion 1 to 2 inches broad. (Pl. IX.)

This is a coarse, conspicuous fungus. It was first described as Lentinus on account of the serrate character of the gills mentioned in the above description. This species was collected in Alabama and described by Prof. Peck in 1896; since that date several collections have been made in the District of Columbia, but it is not generally reported as having a wide distribution.

PLEUROTUS.

The genus Pleurotus is chiefly distinguished among the white-spored agarics by the excentric stem or resupinate cap. The stem is fleshy and continuous with the substance of the cap, but it is subject to great variation in the different species and may be excentric, lateral, or en-

tirely absent. The gills are decurrent or sometimes adnate, edge acute. Most of the species grow on wood, buried roots, or decayed stumps. This genus corresponds to Claudopus of the pink-spored and Crepidotus of the brown-spored forms.

Pleurotus ostreatus. Oyster mushroom. (Edible.)

Cap either sessile or stipitate, shell shaped or dimidiate, ascending, fleshy, soft, smooth, moist, in color white, cream, grayish to brownish ash; **stem** present or absent (if present, short, firm, elastic, ascending, base hairy); **gills** white, decurrent, somewhat distant, anastomosing behind to form an irregular network.

Cap 3 to 5 inches broad; mostly cespitose imbricated. (Pl. VII, fig. 1.)

A very fine edible species, growing on limbs or trunks of living or dead trees, of cosmopolitan distribution, appearing from early summer until late fall.

Pleurotus sapidus. (Edible.)

This species very closely resembles *Pleurotus ostreatus* and is distinguished from it by the lilac-tinged spores, a character difficult or impossible for the amateur to detect. From the mycophagist's point of view, these two species are equally attractive.

Pleurotus serotinus. (Edible.)

Cap fleshy, compact, convex or nearly plane, dimidiate reniform, suborbicular, edge involute, finally wavy, smooth, yellowish green, sooty olive, or reddish brown, in wet weather with a viscid pellicle; **gills** close, distinct, whitish or yellowish, minutely tomentose or squamulose with blackish points.

Cap 1 to 3 inches broad.

In general appearance this fungus resembles *Claudopus nidulans*, but is separated from it by the color of the spores, Pleurotus belonging to the section of white-spored agarics and Claudopus to the rosy-spored species. The plants grow on dead branches or trunks and are gregarious or imbricate.

Pleurotus serotinus is edible but not particularly good, its chief recommendation being the lateness of its occurrence in the fall, when other more tempting species have disappeared.

Pleurotus ulmarius. (Edible.)

Cap fairly regular, although inclined to excentricity, convex, margin incurved, later plane, horizontal, even, smooth, white or whitish, at disk shades of tan or brown; **flesh** white, tough; **gills** broad, rather distant or rounded behind; **stem** more or less excentric, curved, ascending, firm, solid, elastic, thickened, and tomentose at the base.

Cap 3 to 5 inches broad; stem 2 to 3 inches long.

This species occurs abundantly on dead elm branches or trunks or growing from wounds of living trees. Though exhibiting a special fondness for this host, it is not confined to elm trees. It is readily distinguished from *Pleurotus ostreatus* by the long stem and by the emarginate or rounded gills. It is considered an excellent edible species and occurs abundantly in the fall.

CANTHARELLUS.

In the genus Cantharellus the cap is fleshy or submembranaceous, continuous with the stem, and has the margin entire, wavy, or lobed. The gills are decurrent, thick, narrow, blunt, foldlike, irregularly forked, and connected by netlike veins. The two species here discussed are of common occurrence.

Cantharellus aurantiacus. False chanterelle.

Cap fleshy, soft, somewhat silky, shape variable, convex, plane or infundibuliform, margin wavy or lobed, inrolled when young, later simply incurved, dull orange or brownish, especially in the center; **flesh** yellowish; **gills** rather thin, decurrent, forked, dark orange; **stem** spongy, fibrous, colored like the cap, larger at the base than at the apex.

Plant 1 to 3 inches in height; cap 1 to 3 inches broad.

This plant is more slender and the gills are thinner than those of *Cantharellus cibarius*, from which it can be readily distinguished. The taste is generally mild, but sometimes slightly bitter. Foreign and American mycophagists do not agree in regard to the edibility of the species. It is common on the ground or on very rotten logs.

Cantharellus cibarius. The chanterelle. (Edible.)

Cap fleshy, thick, smooth, irregularly expanded, sometimes deeply depressed, opaque egg yellow, margin sometimes wavy; **flesh** white; **gills** decurrent, thick, narrow, branching or irregularly connected, same color as cap; **stem** short, solid, expanding into a cap of the same color.

Plant 2 to 4 inches in height; cap 2 to 3 inches broad. (Pl. X, fig. 2.)

An agreeable odor of apricots may be observed, especially in the dried plants of this species, but its absence need not be construed as affecting the validity of an identification established by other characters. The chanterelle has long been considered one of the most highly prized edible mushrooms. The remark of a foreign mycologist is recalled that "The chanterelle is included when the most costly dainties are sought for state dinners."[1] It is a common summer species found in open woods and grassy places.

CLITOCYBE.

The white-spored genus Clitocybe contains many species, and some of them possess definite generic characters which render identification easy, while others are extremely difficult to recognize. The cap is generally fleshy, later in some species concave to infundibuliform, thinner at the margin, which is involute. The gills are adnate or decurrent. The stem is externally fibrous, tough, not readily separable from the flesh of the cap. The gills in Clitocybe are never sinuate, a character separating it from Tricholoma, with which it agrees in having a fibrous stem.

Clitocybe amethystina. (Edible.)

Cap at first hemispherical, later broadly convex or nearly plane, sometimes depressed in the center and umbilicate, hygrophanous, violaceous when moist, grayish or grayish white when dry, often striate on the margin when young; **gills** violaceous, rather thick, subdistant, adnate or slightly decurrent; **stem** slender, fibrillose, rigid, straight or flexuose, stuffed, later hollow, paler than the moist cap.

Cap 1 to 2 inches broad; stem 2 to 3 inches long.

This species is edible, but slightly tough. Its characters are quite constant, and it should be recognized by the violaceous color of the cap when moist, the grayish hue when dry, and the persistent violaceous color of the gills.

Clitocybe dealbata. (Edible.)

Cap convex, then plane, finally revolute and undulate, dry, even, smooth, somewhat shining; **flesh** thin, dry, white; **gills** adnate, crowded, scarcely decurrent, white; **stem** equal, erect or ascending, stuffed, wholly fibrous, apex subpruinose.

[1] Berkeley.

Cap 1 to 1½ inches broad; stem about 1 inch long.

This species is edible, common, and of quite wide distribution, occurring in grass and woodlands. The ivory top is quite distinctive.

Clitocybe illudens. (Poisonous.)

Cap fleshy, convex or expanded, then depressed, sometimes with a small umbo, saffron yellow, in age becoming sordid or brownish; **gills** broad, distant, unequally decurrent; **stem** solid, firm, smooth and tapering toward the base, ascending, curved, rarely erect, color same as cap.

Cap 4 to 6 inches broad; stem 5 to 8 inches long. (Pl. X, fig. 1; from M. A. Williams.)

This is a very striking fungus both on account of its color and the large clumps it forms about stumps or decaying trees. It is often irregular in form, from the crowded habit of growth. On account of the phosphorescence which renders it conspicuous at night, it is commonly known as the jack-o'-lantern. While not considered poisonous, it produces illness and is to be carefully avoided. It may be found from August to October.

Clitocybe laccata. (Edible.)

Cap thin, convex or later expanded, even or slightly umbilicate, smooth or scurfy, hygrophanous when moist, dull reddish yellow; **gills** adnate, notched or decurrent, pinkish; **stem** slender, equal, fibrillose, purple, base clothed with a white tomentum.

Cap one-half to 2 inches broad; stem 1 to sometimes 5 inches long. (Pl. XI, fig. 2.)

In *Clitocybe laccata* the flesh is thin, of poor flavor, and inclined to be tough. It has a wide geographic range, is common, and extremely variable in form and character of habitat.

Clitocybe monadelpha. (Edible.)

Cap fleshy, convex, then depressed, at first smooth, later scaly, honey colored to pallid-brownish or reddish; **gills** short, decurrent, flesh colored; **stem** elongated, twisted, crooked, fibrous, tapering at the base, pallid brownish.

Cap 1 to 3 inches broad; stem 3 to 7 inches long. (Pl. VIII, fig. 2; from C. G. Lloyd.)

This species bears a resemblance to *Armillaria mellea*, but may be distinguished from it by the absence of a ring and the decurrent gills. The plants are edible, but soon become water soaked and uninviting. They grow in large clusters in grass or about roots or stumps and are to be found from spring until late fall.

Clitocybe multiceps. (Edible.)

Cap convex, fleshy, firm, thin except on the disk, slightly moist in wet weather, whitish, grayish, or yellowish gray, in young plants sometimes quite brown; **flesh** white, taste mild; **gills** white, close, adnate or somewhat decurrent; **stem** equal or little thickened, solid or stuffed, elastic, firm, somewhat pruinose at the apex.

Cap 1 to 3 inches broad; stem 2 to 4 inches long. (Pl. XI, fig. 1.)

This species is subject to great variation in size, color, shape of gills, texture, and taste. Sometimes the gills are very slightly sinuate, reminding one of the genus Tricholoma. *Clitocybe multiceps* appears abundantly in the spring and autumn, growing in dense clusters often hidden by the grass or stubble. It is edible and by many considered very good.

Clitocybe ochropurpurea.

Cap subhemispherical to flat, in age upturned and irregular, pale yellow or yellowish tan, slightly changing to purple, smooth or somewhat hairy; **gills** adnate or decurrent, thick, broader behind, purple; **stem** solid, equal or swollen in center, conspicuously fibrous, paler in color than the pileus.

Cap 2 to 4 inches broad; stem 2½ to 5 inches long. (Pl. XII, fig. 2.)

This species is very common in the summer and autumn and exhibits a decided preference for clayey soil. It occurs in grassy places or open woods, either solitary or in small clusters.

Clitocybe ochropurpurea is edible and though tough is said to be excellent when well cooked.

OMPHALIA.

In the genus Omphalia the cap is generally thin, at first umbilicate, but later funnel shaped, with the margin either incurved or straight. The stem is cartilaginous, its flesh being continuous with that of the pileus but differing in character. Species of Omphalia are common on rotten wood on hilly slopes and especially abundant in damp weather. Some species are extremely small.

The genus is closely related to Mycena and Collybia, but it is separated from them by the character of the gills, which are decurrent from the first.

Omphalia campanella. (Edible.)

Cap campanulate, sometimes expanded, umbilicate, smooth, hygrophanous, rusty yellow, slightly striate; **gills** narrow, arcuate, yellow, connected by veins, decurrent; **stem** slender, horny, smooth, hollow, brown, paler at apex, hairy at base.

Cap 4 to 8 lines broad; stem may be 1 inch long and scarcely 1 line thick. (Pl. XII, fig. 1.)

This little fungus may be found during the summer and fall. It is very common and widely distributed, growing on rotten logs in clusters or tufts, and exhibits a preference for coniferous wood. It is edible, tender, and of a fairly good flavor.

TRICHOLOMA.

The genus Tricholoma is large and contains both edible and poisonous species, most of which are autumnal and terrestrial. The cap is fleshy, convex, never truly umbilicate or umbonate. A volva and ring are wanting. The gills are attached to the stem and sinuate, the degree depending upon the particular species. It has a fleshy-fibrous stem, generally short and stout, the flesh of which is continuous with that of the cap.

Tricholoma equestre. (Edible.)

Cap convex becoming expanded, margin incurved at first, then slightly wavy, viscid, sometimes scaly, pale yellowish with a greenish or brownish tinge; **flesh** white or slightly yellow; **gills** sulphur yellow, crowded, rounded behind, and almost free; **stem** stout, solid, pale yellow, or white.

Cap 2 to 3 inches broad; stem 1 to 2 inches long, one-half to three-fourths inch thick. (Pl. XIII, fig. 1; Pl. XIV, fig. 3.)

This species has a fairly wide geographical distribution and occurs very abundantly in Virginia, Maryland, and the District of Columbia from the middle of November until about Christmas. It is to be found in pine woods, where it forms irregular or incomplete fairy rings. The plants exert considerable force in pushing their way out of the ground and through the dense mat of needles, which often adhere so closely to the caps that slight elevations are the only indications of the presence of the mushrooms.

Tricholoma equestre is a very excellent edible species and is delicious when fried or made into soup. The latter resembles turkey soup, but possesses a more delicate flavor.

FIG. 1.—ARMILLARIA VENTRICOSA (YOUNG SPECIMEN).

FIG. 2.—ARMILLARIA VENTRICOSA (MATURE SPECIMEN).

FIG. 1.—CLITOCYBE ILLUDENS. (POISONOUS.)

FIG. 2.—CANTHARELLUS CIBARIUS. (EDIBLE.)

FIG. 1.—CLITOCYBE MULTICEPS. (EDIBLE.)

FIG. 2.—CLITOCYBE LACCATA. (EDIBLE.)

FIG. 1.—OMPHALIA CAMPANELLA. (EDIBLE.)

FIG. 2.—CLITOCYBE OCHROPURPUREA. (EDIBLE.)

FIG. 1.—TRICHOLOMA EQUESTRE. (EDIBLE.)

FIG. 2.—URNULA CRATERIUM. (EDIBLE.)

FIG. 3.—AGARICUS CAMPESTRIS. (EDIBLE.)

FIG. 1.—TRICHOLOMA PERSONATUM. (EDIBLE.)

FIG. 2.—TRICHOLOMA TERREUM. (EDIBLE.)

FIG. 3.—TRICHOLOMA EQUESTRE, SHOWING HABITAT. (EDIBLE.)

FIG. 1.—COLLYBIA BUTYRACEA. (EDIBLE.)

FIG. 2.—COLLYBIA DRYOPHILA. (EDIBLE.)

FIG. 3.—COLLYBIA VELUTIPES. (EDIBLE.)

FIG. 1.—COLLYBIA PLATYPHYLLA, TWO PLANTS AND SECTION OF CAP SHOWING BROAD GILLS. (EDIBLE.)

FIG. 2.—COLLYBIA PLATYPHYLLA, SHOWING HABITAT. (EDIBLE.)

Tricholoma nudum. (Edible.)

Entire plant at first violaceous, becoming paler and sometimes reddish; **cap** convex, then expanded and sometimes depressed, moist, smooth, margin incurved, thin, naked, flesh colored, comparatively thin, but firm and solid; **gills** crowded, rounded behind, and somewhat decurrent if cap is depressed, violet, but later may be reddish; **stem** equal, stuffed, violaceous, becoming pale.

Cap 2 to 3 inches broad; stem 2 to 3 inches long, one-half inch thick.

Edible, very good; according to all authorities, the more delicate flavor of young plants makes them preferable to those in which the color changes have taken place; on rich ground among leaves.

Tricholoma personatum. (Edible.)

Cap convex, expanded, slightly depressed, fleshy, moist, pale tan, tinged gray or violet, young plants may be entirely violet, margin downy, involute; **flesh** whitish; **gills** crowded, rather broad, rounded behind, nearly free, violaceous, changing to dull reddish brown; **stem** stout, subbulbous, fibrillose, solid, colored like cap or lighter.

Cap 2 to 5 inches broad; stem 1½ to 2½ inches long, one-half to three-fourths inch thick. (Pl. XIV, fig. 1.)

Tricholoma personatum is to be found quite commonly in the late summer and fall months on the ground in the woods and open places. One of the most acceptable edible species.

Tricholoma personatum and *T. nudum* are often confusing to the amateur, but may be separated from each other by the fact that in *T. nudum* the margin of the cap is naked and thinner than in *T. personatum.*

Tricholoma russula. (Edible.)

Cap convex, later plane, and sometimes depressed in center, granular, viscid in damp weather, red or flesh colored, becoming lighter at the margin, which is involute and in young plants downy; **flesh** white or tinged with red under the cuticle, taste mild; **gills** rounded or somewhat decurrent, rather distant, white, later becoming red spotted; **stem** solid, white, stained with red dots, or squamules.

Cap 3 to 5 inches broad; stem 1 to 3 inches long, one-half to three-fourths inch thick.

This species is to be found in mixed woods and hilly slopes from August until after frost. It may occur solitary, but often is found in patches. Edible and reported of fine flavor.

There is frequently a sharp line of demarcation which appears like a well-defined ridge between the gills and the substance of the stem.

Tricholoma terreum. (Edible.)

Cap fleshy, convex, or nearly plane, sometimes umbonate, innately fibrillose, floccose or scaly, grayish brown or mouse colored; **flesh** white or light gray; **gills** subdistant, adnexed, white or ash colored; **stem** solid or hollow.

Cap 1 to 3 inches broad; stem 1 to 2 inches long. (Pl. XIV, fig. 2.)

This species grows on the ground in mixed or coniferous woods. It is found abundantly from September to November and much later in Virginia, Maryland, and the District of Columbia.

Tricholoma terreum frequently occurs in association with *T. equestre,* appearing in abundance when the season has been too dry for a good run of *T. equestre.*

COLLYBIA.

In the genus Collybia the volva and veil are both wanting, and the cap is fleshy, usually thin with incurved margin. The gills are free, notched or sinuate, membranaceous, and soft; the stem is cartilagi-

nous or hollow, with a cartilaginous bark, and differs in substance from the cap.

Mycena and Collybia both have cartilaginous stems, but in young plants of Collybia the margin of the cap is inrolled, while in Mycena it is straight and closely applied to the stem.

Species of Collybia are to be found in woods on rotten stumps, on decayed leaves, and on lawns. A strong alkaline or rancid odor is peculiar to some species, and the presence of such a character should be noted while collections are fresh. Many species are edible.

Collybia butyracea.

Cap reddish brown, dark in center, becoming pale toward the margin, convex, then expanded, somewhat umbonate, smooth, even, dry but feeling oily; **flesh** soft, buttery, white or flesh colored; **gills** thin, crowded, slightly adnexed, edge notched, white, never spotted; **stem** cartilaginous, striate, hollow or stuffed, reddish, generally smooth, but may be downy, attenuated upward.

Cap 2 to 3 inches broad; stem 2 to 3 inches long. (Pl. XV, fig. 1; from Geological and Natural History Survey of Connecticut.)

Collybia butyracea may be distinguished from *C. dryophila*, by the variable color of the dark, umbonate, greasy-looking cap, the somewhat uneven edges of the gills, and the upward-tapering stem. It is found solitary or gregarious in woods, especially under coniferous trees, and it is reported to be edible.

Collybia dryophila.

Cap convexo-plane, sometimes depressed in center, smooth, tan or reddish bay brown, margin even or sometimes irregular, incurved when young; **flesh** white, thin; **gills** narrow, crowded, almost free, or with a decurrent tooth, white or pale; **stem** smooth, cartilaginous, hollow, yellowish or reddish, base sometimes enlarged.

Cap 1 to 3 inches broad; stem 1 to 3 inches long, 2 to 4 lines thick. (Pl. XV, fig. 2.)

The species is common, usually found in woods, but sometimes in lawns and open places, and is subject to variations difficult to definitely describe. One peculiarity occasionally observed is the development of certain abnormal outgrowths of the cap tissue.

Collybia dryophila is reported to be edible by American mycophagists, but one foreign authority has cited a case of illness which followed its use.

Collybia platyphylla. Broad-gilled Collybia. (Edible.)

Cap convex, then expanded plane, brown or grayish, streaked with dark fibrils, watery when moist, margin upturned in wet weather or when old; **flesh** white; **gills** broad, distant, deeply emarginate, white, soft, broken or cracked when old; **stem** whitish, stuffed, striate, sometimes powdered at the apex, bluntly rooted.

Cap 3 to 4 inches broad; stem 3 to 4 inches long, 6 lines thick. (Pl. XVI, figs. 1 and 2.)

This quite common species is one of the large mushrooms found in the early spring and continuously until autumn. In common with several species of this genus, it presents numerous variations and abortive growths; hence, its identification is sometimes puzzling. The abundant, cordlike rooting mycelium may assist in its recognition. It grows either solitary or gregarious on ground containing decaying wood and among leaves near old stumps.

Collybia radicata. Rooting Collybia. (Edible.)

Cap convex to nearly plane, distinctly umbonate, often wrinkled, especially near the umbo, grayish brown or almost white, glutinous when moist, margin incurved when young, sometimes upturned when mature; **flesh** thin, white; **gills** white, broad, ventricose, distant, adnexed, sometimes notched behind; **stem** smooth, striate, grooved or mealy, straight, slightly twisted, same color as the cap, but generally paler, slightly tapering upward, and with a long, rooting base.

Cap 1½ to 3 inches broad; stem 4 to 8 inches long, 3 to 5 lines thick. (Pl. II, fig. 3.)

The "rooted Collybia" may be found in woods or on shaded grassy places, either singly or in groups. It is readily recognized by the distinctive character of the gills and by the tapering, pointed root, which often greatly exceeds the stem in length. It has always been reported as edible and possessing a sweet, delicate flavor until recently, when collections of distinctly bitter plants were made in New York.

Collybia velutipes. (Edible.)

Cap convex, soon plane, sometimes irregular and excentric, smooth, viscid, tawny yellow, with margin probably lighter than the disk; **flesh** thick in the center, thin at the margin, soft, watery, white or yellowish; **gills** broad, rather distant, unequal, tawny or light yellow, rounded behind and slightly adnexed; **stem** tough, cartilaginous, densely velvety villose, deep umber becoming black, equal or slightly enlarged at base, hollow or stuffed.

Cap 1 to 3 inches broad; stem 1 to 3 inches long, 2 to 4 lines thick. (Pl. XV, fig. 3; from C. G. Lloyd.)

The velvety-stemmed Collybia is readily recognized by its dark villose stem and viscid cap, which in wet weather may even appear to have a thick, glutinous coat. It grows on ground which contains decaying wood, on stumps, or even on living trees where the mycelium may have gained entrance through a wound. In such instances it assumes a semiparasitic habit and considerable injury to the tree may result. While *Collybia velutipes* is reported as occurring in every month of the year, it is especially a cold-weather species.

MYCENA.

In the genus Mycena the cap is thin, conic or bell shaped, and usually streaked with longitudinal lines. In some species it is blunt or umbonate when expanded. The margin is at first straight and closely applied to the stem. The gills are adnate or adnexed, and in some species there is a slight decurrent tooth.

The plants are small, brittle, and often possess a strong alkaline odor or an odor of radishes, which frequently disappears in drying. As the odor is not permanent, the collector should promptly note the character when the specimens are fresh. One species not here described is bitter.

Mycena epipterygia.

Cap conic or bell shaped, rather obtuse, gray, viscid, skin peeling off readily when moist, margin striate, sometimes notched; **gills** whitish or gray, tinged with red or blue, decurrent by a tooth; **stem** tough, hollow, flexuous or straight, yellowish or same color as cap, viscid when moist, villose at base.

Cap one-half to 1 inch broad; stem 2 to 4 inches long, perhaps less than 1 line thick.

These little plants are widely distributed and grow either solitary or in clusters on the ground or on branches among moss and dead leaves. They are devoid of the alkaline odor possessed by a number of the other species of this genus. The subject of their edibility appears not to have received attention.

Mycena galericulata. (Edible.)

Cap conical, bell shaped, umbonate when expanded, dry and smooth, brownish gray, striate to the umbo; **gills** white to flesh colored, adnate, slightly decurrent, rather distant, unequal, connected by veins; **stem** hollow, rigid, polished, villose at base.

Cap three-fourths inch to 1½ inches broad; stem 1 to 3 inches long, 2 lines thick. (Pl. XVII, fig. 1; from F. E. Clements.)

This is an extremely variable species. Authors sometimes recognize three varieties, *longipes*, *expansus*, and *calopus*. The variety *longipes* is distinguished by the extreme length of the stem, the variety *expansus* by the breadth and expansion of its cap, and *calopus*, the most attractive variety, by the chestnut-colored stem. The plants are common and often abundant, generally growing in clusters united by the downy hairs of the base of the stems. Both caps and stems of young plants are reported edible and as possessing a delicate flavor.

Mycena polygramma.

Cap conical, bell shaped, umbonate when expanded, smooth, grayish brown, margin striate; **gills** narrow, white, adnate, and slightly decurrent; **stem** tough, hollow, shining, striate or sulcate, paler than the cap, villose at base.

Cap three-fourths to 1 inch broad; stem about 5 inches long and 1 line thick.

This species closely resembles *Mycena galericulata* and has the same general habit of growth, the main point of difference being its long, tough, shining striate or parallel-grooved stem.

Mycena pura.

Cap conical, bell shaped, or convex and expanded, obtusely umbonate, smooth or sometimes rugose in the center, rose colored, purple, or lilac, margin finely striate; **gills** broad, adnate to sinuate when old, entirely white or colored like the cap and white on the edge, which is sometimes wavy; **stem** white when young, later colored like the cap and lighter at apex, straight or ascending, hollow, smooth or slightly villose at base.

Cap three-fourths inch to 1½ inches broad; stem 2 to 3 inches long, 1 to 2 lines thick.

This species is common, widely distributed, and may be collected in moist woods or open grassy places. The entire plants are of an almost uniform color and have a strong odor of radishes.

LACTARIUS.

The distinguishing feature of the genus Lactarius is the presence of a white or colored milk, especially in the gills. The entire plant is brittle and inclined to rigidity. The fleshy cap is more or less depressed and frequently marked with concentric zones. The gills are often somewhat decurrent, but in certain species are adnate or adnexed, unequal in length, and often forked. The stem is stout, rigid, central, or slightly excentric.

Lactarius chelidonium. (Edible.)

Cap firm, convex and depressed in the center, glabrous, slightly viscid when moist, grayish yellow or tawny, at length stained bluish or greenish, generally zonate, margin involute at first and naked; **gills** narrow, crowded, sometimes forked, and sometimes joining to form reticulations, adnate or slightly decurrent, saffron yellow to salmon; **stem** short, nearly equal, hollow, colored like the cap.

Cap 2 to 2½ inches broad; stem 1 to 1½ inches long, about one-half inch thick. (Pl. XVII, fig. 2.)

This species is closely related to *Lactarius deliciosus*, to which in flavor and substance it is scarcely inferior. It is paler than that species and the milk is saffron yellow rather than orange. The plants are fragile and when wounded turn blue, and later green. They are to be found especially in dry localities in the vicinity of pine woods in September and October.

Lactarius deceptivus. (Edible.)

Cap fleshy, convex umbilicate, then expanded and centrally depressed, somewhat infundibuliform, white or whitish, margin at first involute, covered with a dense soft cottony tomentum, filling the space between the margin and the stem, finally spreading or elevated and more or less fibrillose; **gills** whitish or cream colored, rather broad, distant or subdistant, adnate or decurrent, forking; **stem** solid, nearly equal, pruinose-pubescent.

Cap 2½ to 5½ inches broad; stem three-fourths inch to 3 inches long. (Pl. XVII, fig. 3.)

Lactarius deceptivus is found in woods and open places from July to September. It is coarse, but fairly good after its peppery taste is lost by cooking.

Lactarius deliciosus. (Edible.)

Cap convex, but depressed in the center when quite young, finally funnel shaped, smooth, slightly viscid, deep orange, yellowish or grayish orange, generally zoned, margin naked, at first involute, unfolding as the plant becomes infundibuliform; **flesh** soft, pallid; **gills** crowded, narrow, often branched, yellowish orange; **stem** equal or attenuated at the base, stuffed, then hollow, of the same color as the cap except that it is paler and sometimes has dark spots.

Cap 2 to 5 inches broad; stem 1 to 2 inches long, 1 inch thick.

This fungus is distinctive, on account of its orange color and the concentric zones of light and dark orange on the cap and because of the saffron red or orange milk. A peculiarity of the plant is that it turns green upon bruising and in age changes from the original color to greenish. *Lactarius deliciosus* is widely distributed and of common occurrence, appearing on the ground in woods, solitary or in patches, from June or July to October. As the name indicates, it is considered a delicious species, and that it has a preeminent claim to the name is unchallenged. Even by the ancients it was considered "food for the gods."

Lactarius fumosus. (Suspicious.)

Cap convex, plane or slightly depressed, snuff brown or coffee colored, dry glabrous or pruinose, very smooth, margin entire or sometimes wavy; **flesh** white, changing to reddish when wounded; **gills** subdistant, adnate, or slightly decurrent, white then yellow, becoming pinkish or salmon where bruised; **stem** nearly equal or slightly tapering downward, stuffed, then hollow, colored like the cap.

Cap 2 to 3 inches broad; stem 1½ to 2½ inches long, about 6 lines thick.

This species varies considerably in size, color, and closeness of the gills. The distinguishing features for field identification are the coffee-colored cap and the changeable color of the flesh and gills. Its use should be strictly avoided, as it closely resembles *Lactarius fuliginosus*, a poisonous species. These two species, *L. fumosus* and *L. fuliginosus*, are sometimes considered identical.[1]

Lactarius indigo. (Edible.)

Cap at first umbilicate and the margin involute, later cap depressed or infundibuliform and margin elevated, indigo blue with a silvery gray luster, zonate, fading in age, becoming greenish and less distinctly zoned, milk abundant and dark blue; **gills** crowded, indigo blue, changing to greenish in age; **stem** short, nearly equal, hollow.

[1] Burlingham, Gertrude S. Study of the Lactariæ of the United States. Memoirs, Torrey Botanical Club, v. 14, no. 1, p. 84, 1908.

Cap 2 to 5 inches broad; stem 1 to 2 inches long. (Pl. XVIII, fig. 2.)

Lactarius indigo is easily recognized by its striking blue color. It occurs in mixed or coniferous woods in summer and autumn. Though not particularly abundant, several plants are generally found in fairly close range of one another.

Lactarius piperatus. Pepper cap. (Edible.)

Cap fleshy, thick, convex, umbilicate, when mature funnel shaped, even, smooth, zoneless, margin involute when young; **flesh** white; **gills** narrow, crowded, edge obtuse, in some forms arcuate, and then extended upward, white, reported with occasional yellow spots; **stem** equal or tapering below, thick, white, sometimes pruinose.

Cap 3½ to 5 inches broad, sometimes reported considerably larger; stem 1 to 2 inches long. (Pl. XVIII, fig. 1; from G. F. Atkinson.)

The milk in the "pepper cap" is abundant, white, unchangeable, and extremely acrid, to which character is due the specific name. This species is very common and abundant from June to October.

Lactarius torminosus. (Poisonous.)

Cap convex then depressed, surface viscid when young or moist, yellowish red or ochraceous with pink shades, margin involute when young, persistently tomentose hairy; **gills** crowded, narrow, often tinged with yellow or flesh color; **stem** cylindrical or slightly tapering at the base, hollow, whitish.

Cap 2 to 3½ inches broad; stem 1½ to 3 inches long, 4 to 8 lines thick. (Pl. XVIII, fig. 3; from G. F. Atkinson.)

According to some authors this species is injurious only when raw. It is cooked and eaten in Sweden. In Russia it is enjoyed dressed with oil and vinegar or it is preserved by drying.

Lactarius volemus. (Edible.)

Cap convex, nearly plane or slightly depressed, glabrous, dry, azonate, brownish terra cotta, somewhat wrinkled when old; **gills** adnate or slightly decurrent, close, whitish, becoming sordid or brownish when bruised; **stem** more or less equal, firm, solid, glabrous, colored like the cap or paler; milk white, abundant, and mild, becoming thick when exposed to the air.

Cap 2 to 5 inches broad; stem 1 to 4 inches long, 4 to 10 lines thick. (Pl. XIX, fig. 1.)

This species is considered delicious, and is quite common from midsummer to frost on semicleared or sprout land.

RUSSULA.

The genus Russula is similar in form, brittleness, and general appearance to Lactarius, from which it differs only in the absence of milk. The species are very abundant in the summer, extending into the fall months.

Most species of Russula are regarded as edible, but several are known to be poisonous. It is advisable to abstain from eating any red forms until perfectly familiar with the different species.

Russula emetica. (Poisonous.)

Cap oval to bell shaped, becoming flattened or depressed, smooth, shining, rosy to dark red when old, fading to tawny, sometimes becoming yellow, margin finally furrowed and tuberculate; **flesh** white, but reddish under the separable pellicle; **gills** nearly free, somewhat distant, shining white; taste very acrid; **stem** stout, spongy-stuffed, fragile when old, white or reddish.

Cap 3 to 4 inches broad; stem 2½ to 4 inches long.

Russula emetica is a handsome plant of wide distribution found during summer and autumn on the ground in woods or open places. Although some enthusiastic mycophagists testify to its edibility, it is best to consider the species poisonous.

Russula ochrophylla.

Cap convex, becoming nearly plane or very slightly depressed in the center, when old purple or purplish red, margin even, sometimes faintly striate when old; **flesh** white, purplish under the cuticle; **gills** adnate, entire, a few forked at the base, interspaces somewhat venose, at first yellowish, ochraceous buff when mature, powdery from the spores; **stem** mostly equal, solid or spongy within, rosy or red, paler than the cap.

Cap 2 to 4 inches broad; stem 2½ to 3 inches long.

Russula ochrophylla may be found growing singly or in small patches on the ground in woods, mostly under trees, according to Prof. Peck, especially under oak trees. In Virginia, Maryland, and the District of Columbia it is abundant in July and August and is to be found less frequently in September and the first part of October.

Russula roseipes. (Edible.)

Cap convex, sometimes plane or slightly depressed, at first viscid, then dry and faintly striate on the margin, rosy red, frequently modified by pink or ochraceous shades; **gills** moderately close, ventricose, more or less adnate, whitish becoming yellow; **stem** stout, stuffed or somewhat hollow, white tinged with red.

Cap 1 to 2 inches broad; stem 1½ to 3 inches long.

This species grows on the ground in mixed, but generally coniferous, woods. It appears in the late summer and autumn and is reported excellent, though, as already stated, the amateur should be cautious and avoid all red species of this genus.

Russula rubra.

Cap convex, flattened, finally depressed, dry, pellicle absent, polished, cinnabar red, becoming tan when old; **flesh** white, reddish under the cuticle; **gills** adnate, somewhat crowded, whitish then yellowish, often red on the edge; **stem** stout, solid, varying white or red.

Cap 2½ to 4 inches broad; stem 2 to 3 inches long, about 1 inch thick.

This species is extremely acrid, and, as there are conflicting opinions concerning its edibility, it is best for the amateur to refrain from collecting it. It is found in woods on the ground in summer and autumn.

Russula virescens. (Edible.)

Cap at first rounded, then expanded, when old somewhat depressed in the center, dry, green, the surface broken up into quite regular, more or less angular areas of deeper color, margin straight, obtuse, even; **gills** adnate, somewhat crowded, equal or forked; **stem** equal, thick, solid or spongy, rivulose, white.

Cap 3½ to 5 inches broad; stem about 2 inches long. (Pl. XIX, fig. 2.)

This fungus is noticeable on account of the color and areolate character of the cap. In Virginia, Maryland, and the District of Columbia it occurs commonly either solitary or in small patches, but not in very great abundance, from July to September, but it has been found from June through the entire summer and into October. The species is edible and of good flavor.

HYGROPHORUS.

In the genus Hygrophorus the cap is viscid, moist, or hygrophanous, and the flesh is continuous with that of the stem. The gills are generally distant, adnexed, adnate or decurrent, thick with acute edge, watery, and of waxy consistency. Hygrophorus is closely related to Cantharellus, the gills of which are blunt and forked but never waxy.

In Hygrophorus the cap is sometimes regular but often plicate or folded and the margin irregular, wavy, or lobed. The genus is comprised of many attractive species, some of which are conspicuous because of their bright colors.

Hygrophorus chrysodon. (Edible.)

Cap fleshy, convex, then expanded, margin involute when young, viscid, shining when dry, white, with scattered golden squamules; **gills** white, distant, decurrent; **stem** stuffed, soft, nearly equal, white, with minute yellow squamules, more numerous toward the apex, where they are often arranged in the form of a ring.

Cap 2 to 3 inches broad; stem 2 to 3 inches long.

This plant is easily recognized on account of the golden granules on the cap and stem. It grows on the ground in woods or open situations in the late summer and fall, but is not of very common occurrence.

Hygrophorus coccineus. (Edible.)

Cap convexo-plane, obtuse, hygrophanous, smooth, scarlet, becoming yellowish in age, fragile, generally unequal; **gills** adnate, decurrent with a tooth, distant, connected by veins, light yellow in the middle, purplish at the base when mature; **stem** hollow then compressed, base always yellow, scarlet upward.

Cap 1 to 2 inches broad; stem about 2 inches long.

This species occurs in moist places and on mossy banks.

Hygrophorus conicus. (Edible.)

Cap strikingly conical, yellow, orange, scarlet, margin often lobed; **gills** free or adnate, rather loose and broad, yellow; **stem** equal, hollow, fibrous striate, yellow or scarlet.

Cap one-half to 1 inch broad; stem 3 to 5 inches long.

This is a very attractive little fungus on account of its bright color and symmetrical conical cap. A very distinctive character is the blackening of the fungus in drying. It occurs on the ground in rich woods and in damp places near streams from August to September or later.

Hygrophorus eburneus. (Edible.)

Cap fleshy, sometimes thin, again moderately thick, convex to expanded, smooth, white, exceedingly glutinous, margin involute when young, later wavy; **gills** decurrent, distant, veined at the base; **stem** unequal, spongy to stuffed, sometimes hollow, glutinous, attenuated toward the base.

Cap 1 to 3 inches broad; stem quite variable in length.

This species possesses a fair flavor and mild odor, but is of rather tough consistency. It occurs in woods and pastures in the fall, September to October.

Hygrophorus hypothejus. (Edible.)

Cap convex, somewhat depressed, at first covered with an olivaceous slime, after its disappearance ash colored, pale yellow, orange, or often rufescent; **flesh** thin, white, becoming light yellow; **gills** decurrent, distant, whitish or pallid, later yellow or flesh colored; **stem** equal, viscid, stuffed, becoming hollow, paler than the cap.

Cap 1 to 1½ inches broad; stem 2 or more inches long.

This is an interesting little species, occurring late in the fall in pine woods. The partial veil is floccose, but early fugacious, and is of such a transitory character that it is of very little value to the amateur in identifying the species. It is edible, though not especially adapted to cooking, but when dried it is nutty and fairly palatable.

FIG. 1.—MYCENA GALERICULATA. (EDIBLE.)

FIG. 2.—LACTARIUS CHELIDONIUM. (EDIBLE.)

FIG. 3.—LACTARIUS DECEPTIVUS. (EDIBLE.)

FIG. 1.—LACTARIUS PIPERATUS.

FIG. 2.—LACTARIUS INDIGO. (EDIBLE.)

FIG. 3.—LACTARIUS TORMINOSUS. (POISONOUS.)

FIG. 1.—LACTARIUS VOLEMUS.

FIG. 2.—RUSSULA VIRESCENS. (EDIBLE.)

FIG. 3.—MARASMIUS OREADES. (EDIBLE.)

FIG. 1.—LENTINUS LEPIDEUS.

FIG. 2.—CLAUDOPUS NIDULANS.

FIG. 1.—VOLVARIA BOMBYCINA.

FIG. 2.—PAXILLUS RHODOXANTHUS. (EDIBLE.)

FIG. 1.—PLUTEUS CERVINUS. (EDIBLE.)

FIG. 2.—COPRINUS COMATUS. (EDIBLE.)

FIG. 1.—PHOLIOTA ADIPOSA. (EDIBLE.)

FIG. 2.—PHOLIOTA ADIPOSA, GROWING FROM A WOUND IN A LIVING TREE (EDIBLE.)

FIG. 1.—CORTINARIUS LILICINUS. (EDIBLE.)

FIG. 2.—PHOLIOTA SQUARROSA. (EDIBLE.)

MARASMIUS.

The plants of the genus Marasmius are thin, tough, and membranaceous, never decaying, but drying up and shriveling. When moistened they again expand and assume their original form, a character peculiar to this genus. The gills are variously attached and often narrow, distant, and connected by prominent anastomosing veins. The stem is cartilaginous or horny and continuous with the cap, but of a different texture.

Most of the species grow upon wood or leaves and some have an odor of garlic or onions. Marasmius is closely related to Collybia, Lentinus, and Panus. Certain species have been described as belonging to Collybia and are especially difficult of identification. The majority of the species of Marasmius have a central stem, while the stem in Lentinus and Panus is variable, being central, excentric, lateral, or absent. Marasmius species are also much smaller than those of the genera mentioned.

Marasmius cohaerens.

Cap fleshy, convex to plane, sometimes umbonate, tan to chestnut, perhaps darker in the center; margin wavy, striate when damp; **gills** narrow, crowded, adnate, but notched, tan colored; **stem** hollow, shining, color same as cap, darker and slightly enlarged toward the base, rooting.

Cap one-half to 1 inch broad; stem 2 to 4 inches long, 1½ lines thick.

The species grows on the ground or on rotten logs in dense clusters, as many as 20 being closely bound together by a growth of hairs at the base of the stems. It is not common but is widely distributed. It has been identified by some collectors as a member of the genus Mycena, by others as a Collybia.

Marasmius oreades. Fairy-ring fungus. (Edible.)

Cap convex, then plane and slightly umbonate, tough, smooth, brownish buff, later cream colored, margin when moist may be striate; **gills** broad, free, distant, unequal, creamy white; **stem** tough, solid, equal, villose in the upper part, smooth at the base.

Cap 1 to 2 inches broad; stem 2 to 3 inches long, 1½ lines thick. (Pl. XIX, fig. 3.)

This is a popular edible species and once learned should always be recognized. It may be preserved for winter use by drying and is also well adapted for pickling.

Marasmius rotula. The collared mushroom.

Cap white or pale yellowish and darker at the disk, papery, deeply furrowed, smooth umbilicate; margin crenate; **gills** the color of the cap, broad, distant, attached to a collar which surrounds the stem; **stem** threadlike, smooth, shining, hollow, blackish.

Cap one-fourth to one-half inch broad; stem 1 to 1½ inches long.

Commonly found on leaves and twigs in forests. The species can be at once recognized by the gills being attached to a collar free from the stem.

LENTINUS.

In the genus Lentinus the plants are tough, leathery, corky, becoming hard and almost woody when old. The cap is generally irregular in form, usually depressed, often scaly or velvety. The gills are slightly or deeply decurrent, unequal, thin with margin notched or

serrate. Some species are sessile; in others a stem is present which is central, excentric, or lateral.

The serrate gills are a constant generic character and serve to separate Lentinus from Panus, which has entire gills. Common on dead or rotten wood.

Lentinus lecomtei. Hairy Lentinus. (Edible.)

Cap variable, funnel shaped, regular or irregular, tawny or reddish brown, hairy or strigose, margin incurved; **gills** pallid, narrow, crowded, edges scarcely at all serrate; **stem** central, excentric, or lateral, generally tawny and hairy when young, sometimes becoming smooth with age.

Cap 2 to 4 inches broad; stem usually 1 to 1½ inches long.

Authorities differ as to the classification of *Lentinus lecomtei*. According to some it more properly belongs to the genus Panus. It is widely distributed and grows upon wood. The plants when young are edible and have a fine flavor.

Lentinus lepideus. Scaly Lentinus. (Edible.)

Cap convex, becoming more or less depressed and irregular, tan to yellow, with dark scales; **gills** decurrent, broad, crowded, sinuate, white; **stem** central or excentric, whitish, hairy or scaly, solid, equal, or tapering at the base.

Cap 2 to 4 inches broad, often larger, stem about 1 inch long. (Pl. XX, fig. 1; from F. E. Clements.)

This is a widely distributed species and very common, especially upon pine, oak, and decaying stumps. When young and tender it is edible, and even when old is recommended for use in soup.

PANUS.

Plants of the genus Panus closely resemble those of Lentinus, from which they differ in the character of the edge of the gills. In Panus the gills are normally entire, while in Lentinus the gills are serrate. The only difficulty in using this character as a means of generic separation is the fact that in drying out the margin of the gills may be torn or ruptured. Some authors have considered these genera identical.

Panus stipticus. Bitter Panus.

Cap pale cinnamon to grayish, kidney shaped, scurfy, tough; **gills** not decurrent, thin, narrow, crowded, connected by veins; **stem** short, lateral, solid, ascending pruinose.

Cap one-half to 1 inch broad.

This little species is common on stumps, shriveling in dry and expanding in wet weather. It is characterized by a pronounced astringent taste, which is very unpleasant in its effect on the mouth and throat, and is considered poisonous.

CLAUDOPUS.

The genus Claudopus is easily recognized among the rosy-spored agarics by the cap being excentric, lateral, or resupinate. The stem may be rudimentary or obsolete and the gills sinuate or decurrent. The plants grow upon wood in an inverted position and thus the gills are directed upward. Claudopus resembles Pleurotus and Crepidotus in habit, but differs in the color of the spores.

Claudopus nidulans.

Cap suborbicular or kidney shaped, sessile or narrowed behind into a stemlike base, caps often overlapping, yellow or buff, downy, hairy or scaly toward the involute margin; **gills** broad, rather close, orange yellow.

Cap 1 to 3 inches broad. (Pl. XX, fig. 2; source of photograph unknown.)

Claudopus nidulans is widely distributed and is to be found in the fall, growing on decaying branches, wood, etc. It is easily recognized from its shelving and sometimes resupinate habit, yellow or buff cap, and orange yellow gills. It is edible. The taste is said to be mild and pleasant, but the substance tough.

VOLVARIA.

The genus Volvaria is distinguished by the universal veil, which, becoming ruptured, remains as a large loose cup at the base of the stem, and by the absence of a ring. The stem is easily separable from the cap and the gills are usually free, rounded behind, at first white, but later pink.

The genus is comparable to Amanitopsis among the white-spored agarics in having a volva but no ring. Species of Volvaria grow in rich woods, on leaf mold or rotten wood, and on richly manured ground.

Volvaria bombycina.

Cap globose, bell shaped, later convex and sometimes subumbonate, white, silky when young, smooth at the apex, sometimes scaly when old; **flesh** white; **gills** ventricose, free, not reaching the margin, edge sometimes toothed; **stem** white, solid, smooth, tapering from base to apex; **volva** large, membranaceous, tough, somewhat viscid.

Cap 3 to 8 inches broad; stem 3 to 6 inches long, 6 lines thick. (Pl. XXI, fig. 1.)

This species is widely distributed, but nowhere common. It is found on fallen or living trees of various species.

PLUTEUS.

The genus Pluteus may be recognized among the rosy-spored agarics by its symmetrical cap, central stem distinct from the cap, and free salmon-colored gills. In addition to these features, the absence of a volva and ring will assist in the determination of the species of this genus.

These plants are usually found growing upon wood.

Pluteus cervinus. (Edible.)

Cap at first bell shaped, later convex and expanded to almost plane, fleshy, generally smooth but with radiating fibrils, or sometimes more or less scaly, light brown, grayish brown, or sooty; margin entire; **flesh** white; **gills** broad, ventricose, unequal, free, white becoming flesh colored; **stem** color of cap, paler above, firm, solid, fibrillose or subglabrous, nearly equal but slightly tapering above.

Cap 2 to 5 inches broad; stem 2 to 5 inches long, 3 to 6 lines thick. (Pl. XXII, fig. 1; from C. G. Lloyd.)

Pluteus cervinus occurs intermittently from spring to early fall. It issues from the base of decaying stumps or logs and sometimes appears in great abundance on sawdust piles. It is edible, and when young is tender and of good flavor.

ENTOLOMA.

The genus Entoloma is another rosy-spored agaric in which a volva and an annulus are absent. The cap is somewhat fleshy and the margin incurved, especially when young. The gills are adnate, adnexed, or sinuate.

In form Entoloma corresponds to Tricholoma of the white-spored, Hebeloma of the ocher-spored, and Hypholoma of the brown-spored species.

The edible quality of the species of this genus is variable. Several are reported as edible, while severe poisoning has followed the use of at least four species.

Entoloma grayanum.

Cap fleshy, convex, frequently wavy or irregular, hygrophanous, dull, watery yellow when moist, smooth, shining, and nearly white when dry; **gills** flesh colored, plane, close; **stem** equal, firm, solid, white.

Plant about 3 inches high; cap 1½ to 2 inches broad.

This species grows on the ground and is sometimes gregarious.

PAXILLUS.

In the genus Paxillus the plants are symmetrical or excentric, with a persistently incurved margin. The membranaceous gills are easily separable from the cap and frequently fork and unite, producing a poroid appearance in contrast with the usual platelike gills of agarics.

Paxillus atro-tomentosus.

Cap fleshy, compact, tough, convex, becoming plane or depressed, reddish brown, dry, often tomentose, margin thin, strongly involute; **flesh** white; **gills** adnate, decurrent, forked near the base, often reticulate, sometimes forming pores; **stem** stout, solid, generally excentric, covered with thick dark-brown or black tomentum.

Cap 3 to 5 inches broad; stem 3 to 4 inches long, one-half to 1 inch thick.

This plant is to be found in pine woods, during the late summer and autumn. It is easily recognized because of the stout, black, tomentose stem and mostly irregular cap with incurved margin. Though the species may not be poisonous, its edibility has been questioned, and therefore it is wise to avoid its use.

Paxillus involutus. (Edible.)

Cap compact, fleshy, convexo-plane, depressed, viscid when moist, tawny, ochraceous, perhaps olive or reddish brown, margin downy and strongly involute; **flesh** pallid, changing to reddish brown if bruised; **gills** crowded, decurrent, arcuate when young, branched, anastomosing, forming pores behind; **stem** solid, firm, color of the cap, sometimes slightly excentric.

Cap 2 to 4 inches broad; stem 2 to 3 inches long, about one-half inch thick.

Paxillus involutus is a summer and autumnal species. It grows on the ground or on wood, often frequenting grassy or mossy, swampy places in open woods. There is a certain similarity between this plant and Cantharellus, and on account of this resemblance *Paxillus involutus* is often spoken of as the brown chanterelle; but unlike the true chanterelle its edibility is not to be highly recommended, as the flesh is dry, coarse, and rather tasteless.

Paxillus rhodoxanthus. (Edible.)

Cap convex, when expanded plane or perhaps slightly depressed, reddish yellow or brown, densely tomentose, often becoming cracked and showing the yellowish flesh; **gills** deeply decurrent, forked, and connected by anastomosing veins, some shade of yellow; **stem** with many small, dark dots, paler than the cap, deep yellow at the base.

Plant 2 to 4 inches tall; cap 1¼ to 3 inches broad. (Pl. XXI, fig. 2; from G. F. Atkinson.)

This species is also described as *Gomphidius rhodoxanthus*. Discussion of its synonymy is given by Prof. Atkinson.[1]

PHOLIOTA.

The genus Pholiota is distinguished among the ocher-spored agarics by the presence of an annulus which is membranaceous or friable in character, never cobwebby as in Cortinarius, and it may be persistent or fugacious.

The cap is more or less fleshy, yellowish, tawny, and sometimes scaly. The gills are adnate or slightly decurrent by a tooth.

Species of Pholiota can be distinguished from brown forms of Cortinarius by the cobwebby veil of the latter.

Pholiota adiposa. (Edible.)

Cap firm, fleshy, subconical, to convex, glutinous when moist, yellowish, brown in center, often torn into dark scales, margin incurved; **flesh** thick at center, spongy, yellowish; **gills** close, adnate, sometimes notched, yellowish to rust color; **stem** firm, whitish to yellow, viscid, clothed with brownish scales below the slight, floccose ring.

Cap 2 to 4 inches broad; stem 2 to 4 inches long, 4 to 6 lines thick. (Pl. XXIII.)

This species, commonly known as the "fatty Pholiota," forms large clusters in the fall, on trunks or crotches of trees or on stumps. It is a rather showy fungus, easily attracting attention because of its tufted habit of growth, yellow color, and conspicuous scales. *Pholiota adiposa* is considered edible by American authorities, and it is substantial and of fairly good flavor. The season is mostly confined to the fall months. With this particular species it is preferable to peel the cap preparatory to cooking.

Pholiota caperata. (Edible.)

Cap fleshy, yellow to yellow-brown, ovate, obtuse or plane when expanded, viscid when moist, sometimes covered with whitish tufts; **gills** adnate, crowded, narrow, may be serrate, yellowish brown; **stem** stout, solid, sometimes slightly enlarged at base, white and shining, scaly above the ring; **ring** membranaceous, broad.

Cap 2½ to 4 inches broad; stem 3 to 5 inches long, one-half to over 1 inch thick.

This fungus appears in the fall quite abundantly in certain localities. The specific name refers to the wrinkled character of the pileus, a prominent and constant feature of the plant. It is edible, slightly acrid when raw, but fairly good when cooked.

Pholiota marginata. (Edible.)

Cap convex, then expanded, obtuse to plane, smooth, hygrophanous, slightly fleshy, tan when dry, honey colored when moist, margin striate; **gills** adnate, crowded, narrow, when mature reddish brown; **stem** hollow, equal, smooth , or slightly fibrillose; color same as the cap, whitish velvety at base; **ring** often distant from apex of stem, soon disappearing.

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[1] Atkinson, G. F. Studies of American Fungi; Mushrooms, Edible, Poisonous, etc., ed. 2, New York, 1903, p. 167.

Cap one-half to 1 inch broad; stem 1 to 2 inches long, about 2 lines thick.

This attractive little fungus appears principally in the fall, but it may occur sparingly during the summer. It grows singly or clustered on rotten stumps or logs and is edible and of excellent quality.

Pholiota squarrosa. (Edible.)

Cap yellowish brown, clothed with dark persistent scales, dry, convex, then flattened, perhaps obtusely umbonate or gibbous; **flesh** light yellow; **gills** crowded, narrow, adnate with a decurrent tooth, pale olive, then rust colored; **stem** stuffed, yellowish brown, with dense, dark recurved scales below the ring, much thinner at base than apex; **ring** near the apex, generally floccose, seldom membranaceous and entire.

Cap 2 to 5 inches broad; stem 3 to 6 inches long. (Pl. XXIV, fig. 2; from C. G. Lloyd.)

This species occurs in many localities from the last of June until frost, growing on trunks of trees and stumps. It is conspicuous because of the large clusters and prominent scales on both cap and stem. The fungus is good, raw or cooked, and by some authorities is considered excellent.

CORTINARIUS.

The genus Cortinarius is easily recognized when young among the ocher-spored agarics by the powdery gills and by the cobwebby veil, which is separable from the cuticle of the cap. In mature plants the remains of the veil may often be observed adhering to the margin of the cap and forming a silky zone on the stem. Cortinarius contains many forms which are difficult of specific determination. Many species are edible, some indifferent or unpleasant, and others positively injurious. The colors are generally conspicuous and often very beautiful. Most of the species occur in the autumn.

Cortinarius cinnamomeus. (Edible.)

Cap rather thin, conic campanulate, when expanded almost plane, but sometimes umbonate, yellow to bright cinnamon colored, with perhaps red stains, smooth, silky from innate, yellowish fibrils, sometimes concentric rows of scales near the margin; **flesh** yellowish; **gills** yellow, tawny, or red, adnate, slightly sinuate and decurrent by a tooth, crowded, thin, broad; **stem** equal, stuffed then hollow, yellowish, fibrillose.

Cap 1 to 2½ inches broad; stem 2 to 4 inches long, 3 to 4 lines thick.

This is a very common and widely distributed species, particularly abundant in mossy coniferous woods from summer until fall. The color of the gills is an extremely variable character, ranging from brown or cinnamon to blood red. A form possessing gills of the latter color is known as *Cortinarius cinnamomeus* var. *semisanguineus*. This species and variety are edible and considered extremely good.

Cortinarius lilicinus. (Edible.)

Cap firm, hemispherical, then convex, minutely silky, lilac colored; **gills** close, violaceous changing to cinnamon; **stem** solid, stout, distinctly bulbous, silky fibrillose, whitish with a lilac tinge.

Cap 2 to 3 inches broad; stem 2 to 4 inches long. (Pl. XXIV, fig. 1.)

This is a comparatively rare but very beautiful mushroom and an excellent edible species.

Cortinarius sanguineus. (Edible.)

Cap convex, then plane, or perhaps slightly umbonate or depressed, blood red, silky or squamulose; **flesh** paler reddish; **gills** crowded, entire, adnate, dark blood red; **stem** stuffed or hollow, sometimes attenuated at the base, dark as the cap and fibrillose, containing a red juice.

Cap 1 to 1½ inches broad; stem 2 to 3 inches long.

This species is much less common in its occurrence than *Cortinarius cinnamomeus*, but is distinctive because of its entire blood-red color.

Cortinarius violaceus. (Edible.)

Cap convex, when expanded almost plane, dry with hairy tufts or scales, dark violet; **flesh** somewhat violaceous; **gills** distant, rather thick and broad, rounded or deeply notched at apex of stem, narrowed at margin of cap, at first violaceous, later brownish cinnamon; **stem** fibrillose, solid, bulbous, colored like cap.

Cap 2 to 4 inches broad; stem 3 to 5 inches long. (Pl. IV, fig. 2; from M. E. Hard.)

This very attractive species is at first a uniform violet, but with age the gills assume a cinnamon hue. The plants appear in woods and open places during the summer and fall, generally solitary, but often in considerable numbers. It is esteemed as one of the best edible species.

NAUCORIA.

Considerable variation is to be observed among species of the genus Naucoria, but distinguishing generic characters are the more or less fleshy cap, at first conical or convex, with involute margin, and the cartilaginous stem, which is hollow or stuffed. The gills are free or adnate, but never decurrent.

Naucoria semiorbicularis. (Edible.)

Cap hemispherical, convex to expanded, smooth, even, slightly viscid when moist, corrugated or cracked when dry and old, tawny, rust colored; **gills** adnate, sometimes notched, crowded, pale, then rust colored; **stem** tough, slender, straight, equal, smooth, hollow, with a free fibrous tube, pale reddish brown, darker at the base.

Cap 1 to 2 inches broad; stem 3 to 4 inches long.

This is one of the most common and widely distributed species. It is among the first to appear in the spring and continues until autumn, being particularly abundant in wet weather.

It is edible, easily cooked, and said to possess an excellent flavor.

GALERA.

The plants of the genus Galera are slender and fragile. The cap is regular, thin, more or less membranaceous, conic or bell shaped, often striate, especially when moist, margin straight, never incurved, as in Naucoria. The gills are adnate or adnexed. The stem is somewhat cartilaginous, hollow, and polished.

Galera tenera. (Edible.)

Cap cone or bell shaped, rust colored when damp, ochraceous when dry, sometimes atomate, hygrophanous, membranaceous, smooth, but striate, when damp; **gills** cinnamon, broad, ascending adnate; **stem** slender, fragile, smooth, sometimes striate, mealy above, paler than cap.

Cap 5 lines to three-fourths inch broad; stem 2 to 4 inches long. (Pl. II, fig. 2; from F. E. Clements.)

This little fungus is very common in lawns or in richly manured places, where it appears early in the spring and persists until frost. It exhibits considerable variation in size and color, the latter ranging from light tan to brown and depending upon conditions of humidity. The species is small but tender and can be preserved for winter use by drying.

AGARICUS.

The genus Agaricus is characterized by brown or blackish spores with a purplish tinge and by the presence of a ring. The cap is mostly fleshy and the gills are free from the stem. The genus is closely related to Stropharia, but separated from it by the free gills and the noncontinuity of the stem and the cap. The species of Agaricus occur in pastures, meadows, woods, and manured ground. All are edible, but certain forms are of especially good flavor. Bright colors are mostly absent and white or dingy brown shades predominate.

Agaricus arvensis. Horse or field mushroom. (Edible.)

Cap convex, bell shaped, then expanded, when young floccose or mealy, later smooth, white or yellowish; **flesh** white; **gills** white to pink, at length blackish brown, free, close, may be broader toward the stem; **stem** stout, hollow or stuffed, may be slightly bulbous, smooth; **ring** rather large, thick, the upper part white, membranaceous, the lower yellowish and radially split.

Cap 3 to 5 inches broad; stem 2 to 5 inches high, 4 to 10 lines thick.

Agaricus arvensis is to be found in fields, pastures, and waste places. It is closely related to the ordinary cultivated mushroom, but differs in its larger size and double ring. It is an excellent edible species, the delicacy of flavor and texture largely depending, like other mushrooms, upon its age.

Agaricus campestris. Common or cultivated mushroom. (Edible.)

Cap rounded, convex, when expanded nearly plane, smooth, silky floccose or squamulose, white or light brown, squamules brown, margin incurved; **flesh** white, firm; **gills** white in the button stage, then pink, soon becoming purplish brown, dark brown, or nearly black, free from the stem, rounded behind, subdeliquescent; **stem** white, subequal, smooth or nearly so; **veil** sometimes remaining as fragments on the margin of cap; **ring** frail, sometimes soon disappearing.

Cap 1½ to 4 inches broad; stem 2 to 3 inches long, 4 to 8 lines thick. (Pl. XIII, fig. 3.)

This is the most common and best known of all the edible mushrooms. It is a species of high commercial value, lending itself to very successful and profitable artificial cultivation. It is cosmopolitan in its geographical distribution, being as universally known abroad as in America. It is cultivated in caves, cellars, and in especially constructed houses; but it also occurs abundantly in the wild state, appearing in pastures, grassy places, and richly manured ground. The only danger in collecting it in the wild form is in mistaking an Amanita for an Agaricus; however, this danger may be obviated by waiting until the gills are decidedly pink before collecting the mushrooms.

Agaricus placomyces. Flat-cap mushroom. (Edible.)

Cap thin, at first broadly ovate, convex or expanded and flat in age, whitish, adorned with numerous minute, brown scales, which become crowded in the center, forming a large brown patch; **gills** close, white, then pinkish, finally blackish brown; **veil**

broad; **ring** large. In the early stages, according to Prof. Atkinson, a portion of the veil frequently encircles the stipe like a tube, while a part remains still stretched over the gills. This condition is well illustrated in Plate XXV, figure 1. **Stem** smooth, stuffed or hollow, bulbous, white or whitish, the bulb often stained with yellow.

Cap 2 to 4 inches broad; stem 3 to 5 inches long, one-fourth to one-half inch thick. (Pl. XXV, fig. 1.)

This species frequents hemlock woods, occurring from July to September.

Agaricus rodmani. (Edible.)

Cap firm, rounded, convex, then nearly plane, white, becoming subochraceous, smooth or cracked into scales on the disk, margin decurved; **flesh** white; **gills** narrow, close, white, changing to pink and blackish brown; **stem** solid, short, whitish, smooth, or perhaps mealy, squamulose above the ring; **ring** double, sometimes appearing as two collars with space between.

Cap 2 to 4 inches broad; stem 2 to 3 inches long, 6 to 10 lines thick.

Agaricus rodmani may easily be mistaken for *Agaricus campestris*, but can be distinguished by the thicker, firmer flesh, narrower gills, which are nearly white when young, and peculiar collar, which appears double. This species grows on grassy ground, often springing from crevices of unused pavements or between the curbing and the walk. It is to be found principally from May to July.

Agaricus silvicola. (Edible.)

Cap convex, expanded to almost plane, sometimes umbonate, smooth, shining, white, often tinged with yellow, sometimes with pink, especially in the center; **flesh** white or pinkish; **gills** thin, crowded, white, then pink, later dark brown, distant from stem, generally narrowed toward each end; **stem** long, bulbous, stuffed or hollow, whitish, sometimes yellowish below; **ring** membranaceous, sometimes with broad floccose patches on the under side.

Cap 3 to 6 inches broad; stem 4 to 6 inches long, 4 to 8 lines thick.

Agaricus silvicola has been known under various names, at one time being considered merely a variety of *Agaricus arvensis*. By Peck [1] it has been recognized as a distinct species, *A. abruptibulbus*. A discussion of the nomenclature of this species may be found in McIlvaine and Macadam.[2]

Agaricus subrufescens. (Edible.)

Cap at first deeply hemispherical, becoming convex or broadly expanded, silky, fibrillose, and minutely or obscurely squamulose, whitish, grayish, or dull reddish brown, usually smooth and darker on the disk; **flesh** white, unchangeable; **gills** at first white or whitish, then pinkish, finally blackish brown; **stem** rather long, often somewhat thickened or bulbous at the base, at first stuffed, then hollow, white; the annulus flocculose or floccose squamose on the lower surface. Two additional characters of assistance in identification are the mycelium, which forms slender branching rootlike strings, and the almondlike flavor of the flesh.

Cap 3 to 4 inches broad; stem 2½ to 4 inches long. (Pl. XXVI.)

The plants often grow in large clusters of 20 to 30 or even 40 individuals. They occur in the wild state and have also been reported as a volunteer crop in especially prepared soil. Specimens collected in the vicinity of Washington, D. C., were found growing near the river on a rocky slope rich in leaf mold. *Agaricus subrufescens* is considered a very excellent edible species.

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[1] Peck, C. H. Report of the State botanist, 1904. New York State Museum, Bulletin 94, p. 36, 1905.

[2] McIlvaine, Charles, and Macadam, R. K. Toadstools, Mushrooms, Fungi, Edible and Poisonous; One Thousand American Fungi. Rev. ed., Indianapolis, [1912], p. 728.

STROPHARIA.

The genus Stropharia is easily recognized among the purple-spored agarics, and is distinguished from Agaricus by its usually adnate gills and the continuity of the flesh of the cap and stem. A ring is always present in young plants, but often absent at maturity. The edibility of species of this genus is a disputed point among mycophagists.

Stropharia semiglobata.

Cap rounded, then hemispherical, thick at center, becoming thin toward the even margin, light yellow, viscid when moist; **gills** broad, adnate, unequal, when young light brown, later purplish brown or blackish; **stem** slender, hollow, even or slightly bulbous, smooth, yellowish, but paler at apex, where striate markings from the gills may be present, viscid; **ring** viscous, incomplete, formed by the remains of the glutinous veil, which soon disappears.

Cap 1 to 1½ inches broad; stem 2 to 3 inches long, 2 to 3 lines thick. (Pl. XXV, fig. 2.)

This species is remarkable for the uniformly hemispherical cap. It occurs commonly on dung or in well-manured ground. Opinions differ regarding its edibility, and it is consequently safe to refrain from collecting the species.

HYPHOLOMA.

The spores of the genus Hypholoma are purple brown. The margin of the cap is incurved in the young condition. The veil generally adheres by fragments to the margin of the cap, rarely forming a distinct ring. The gills are attached to the stem and sometimes are emarginate. The stem is fleshy and continuous with the substance of the cap. Hypholoma shows a close relationship to Agaricus and Stropharia, differing from both in the absence of a distinct ring, and it further differs from Agaricus, in which genus the stem and cap are noncontinuous.

The plants of this genus generally occur in clusters or clumps, arising from decayed wood on or under the ground.

Hypholoma appendiculatum. (Edible.)

Cap rather thin, ovate, then expanded until somewhat flattened, when damp dark brown, tawny when dry, slightly wrinkled and atomate; **flesh** white; **gills** crowded, somewhat adnate, white, at length purplish brown; **stem** white, hollow, equal, smooth, pruinose at apex; **veil** white, delicate, attached to the margin of the cap for a short time.

Cap 2 to 3 inches broad; stem 2 to 3 inches long, 2 to 3 lines thick. (Pl. XXVII, fig. 2; from G. F. Atkinson.)

Specimens of this species may be collected in the late spring, in summer, and frequently in the early fall. The plants are fragile and hygrophanous, scattered, clustered, or densely tufted. They grow on rotten logs, stumps, or sometimes on the ground, arising mostly from rotten wood beneath the surface.

This species is tender and possesses excellent esculent qualities. Drying and preserving for winter use have been recommended, as the flavor is retained to a remarkable degree.

Hypholoma perplexum. (Edible.)

Cap convex, expanding to nearly plane, sometimes umbonate, smooth, reddish or brownish red, margin yellowish; **flesh** white or whitish; **gills** thin, close, rounded at inner extremity, first pale yellow then greenish, later purplish brown; **stem** equal, hollow, fibrillose, yellowish above, reddish brown below.

Cap 1 to 3 inches broad; stem 2 to 3 inches long, 2 to 4 lines thick.

Hypholoma sublateritium and *H. perplexum* are very closely related and by some authorities the latter is regarded as only a variety of *H. sublateritium*, while certain mycologists consider the two species identical. Prof. Peck states that *H. perplexum* may be distinguished by its smaller size, more hollow stem, the yellow-greenish and purplish tints of the gills, and the absence of a bitter flavor. Like *H. sublateritium*, this species occurs abundantly in the fall about stumps or logs, often continuing until freezing weather. The plants grow in clusters and the caps are frequently discolored by the falling spores.

Hypholoma sublateritium. (Edible.)

Cap conical, becoming almost plane, fleshy, firm, smooth, but with fine, silky fibers, brick red, sometimes tawny, margin of lighter color; **flesh** white or yellowish; **gills** narrow, crowded, adnate, sometimes decurrent by a tooth, creamy when young, purplish olivaceous, sometimes with a sooty tinge when mature; **stem** firm, stuffed, attenuated downward, smooth or fibrillose, scaly, light yellowish, rust colored below; **veil** at first white, becoming dark, and may for a time adhere to the margin of the cap.

Cap 2 to 3 inches broad; stem 3 to 4 inches long, 3 to 5 lines thick. (Pl. XXVII, fig. 1; from G. F. Atkinson.)

This species appears very abundantly in the fall, producing large clusters around rotten stumps or decayed prostrate logs. The European form of this plant is reported as bitter and regarded as poisonous. The American form has been frequently eaten, although it has little to recommend it as a delicacy. Catsup has been made from it, but the success of the experiment was doubtless due more to the addition of condiments than to the flavor of the mushrooms.

COPRINUS.

The genus Coprinus is easily recognized by the black spores and the close gills, which at maturity dissolve into an inky fluid. The stem is hollow, smooth, or fibrillose. The volva and ring are not generic characters, but are sometimes present. The plants are more or less fragile and occur on richly manured ground, dung, or rotten tree trunks. The genus contains species of excellent flavor and delicate consistency.

Coprinus atramentarius. Inky cap. (Edible.)

Cap ovate, slightly expanding, silvery to dark gray or brownish, smooth, silky or with small scales, especially at the center, often plicate and lobed with notched margin; **gills** broad, ventricose, crowded, free, white, soon changing to pinkish gray, then becoming black and deliquescent; **stem** smooth, shining, whitish, hollow, attenuated upward, readily separating from the cap; **ring** near the base of stem, evanescent.

Cap 1½ to 4 inches broad; stem 2 to 4 inches long, 4 to 6 lines thick. (Pl. XXVIII.)

This species appears from spring to autumn, particularly after rains. It grows singly or in dense clusters on rich ground, lawns, gardens, or waste places. It has long been esteemed as an edible species. *Coprinus atramentarius* differs from *C. comatus* in the more or less smooth, oval cap and the imperfect, basal, evanescent ring.

Coprinus comatus. Shaggy mane. (Edible.)

Cap oblong, bell shaped, not fully expanding, fleshy at center, moist, cuticle separating into scales that are sometimes white, sometimes yellowish or darker, and show the white flesh beneath, splitting from the margin along the lines of the gills; **gills** broad, crowded, free, white, soon becoming pink or salmon colored and changing to purplish black just previous to deliquescence; **stem** brittle, smooth or fibrillose, hollow, thick, attenuated upward, sometimes slightly bulbous at base, easily separating from the cap; **ring** thin, movable.

Cap usually 1½ to 3 inches long; stem 2 to 4 inches long, 4 to 6 lines thick. (Pl. XXII, fig. 2.)

This species has a wide geographical distribution and is universally enjoyed by mycophagists. The fungus is very attractive when young, often white, again showing gray, tawny, or pinkish tints. It appears in the spring and fall, sometimes solitary, sometimes in groups, on lawns, in rich soil, or in gardens.

Coprinus fimetarius.

Cap at first cylindrical, later conical to expanded, margin splitting, revolute or upturned, grayish to bluish black, surface at first covered with white scales, finally smooth; **gills** black, narrow; **stem** fragile, white, squamulose, hollow, but solid and bulbous at the base.

Cap 1 inch or more across, stem 3 or more inches high. (Pl. XXIX, fig. 1.)

This is a very common and abundant species on manure or rich soil and occurs from spring to winter. It is edible and considered excellent.

Coprinus micaceus. Mica inky cap.

Cap ovate, bell shaped, light tan to brown, darker when moist or old, often glistening from minute, micalike scales, margin closely striate, splitting, and revolute; **gills** narrow, crowded, white, then pink before becoming black; **stem** slender, white, hollow, fragile, often twisted.

Cap 1 to 2 inches broad; stem 2 to 4 inches long and 2 to 3 lines thick. (Pl. XXX, fig. 1; from Geological and Natural History Survey of Connecticut.)

This glistening little species occurs very commonly at the base of trees or springing from dead roots along pavements, or more uncommonly on prostrate logs in shady woods. The plants appear in great profusion in the spring and early summer, and more sparingly during the fall. *Coprinus micaceus* is a very delicious mushroom and lends itself to various methods of preparation.

PSATHYRELLA.

The species comprising the genus Psathyrella are all fragile, having thin membranaceous, striate caps. When young the margin of the cap lies against the stem, but never extends beyond the gills, which are sooty black and not mottled like those of Panaeolus.

Psathyrella disseminata. (Edible.)

Cap thin, oval to bell shaped, yellowish, gray or grayish brown, minutely scaly, becoming smooth, sulcate or plicate, margin entire; **gills** broad, adnate, white, then gray, later black; **stem** hollow, slender, fragile.

Cap about one-half inch broad; stem 1 to 1½ inches long, 1 to 1½ lines thick. (Pl. XXIX, fig. 2; source of photograph unknown.)

This is a delicate little species, appearing on decaying wood or about old roots of trees. It occurs from May until frost, often intermittently from the same center. The species is edible, but has too little substance to render it a popular article of diet.

FIG. 1.—AGARICUS PLACOMYCES. (EDIBLE.)

FIG. 2.—STROPHARIA SEMIGLOBATA.

FIG. 1.—AGARICUS SUBRUFESCENS. (EDIBLE.)

FIG. 2.—AGARICUS SUBRUFESCENS, SHOWING HABITAT. (EDIBLE.)

FIG. 1.—HYPHOLOMA SUBLATERITIUM. (EDIBLE.)

FIG. 2.—HYPHOLOMA APPENDICULATUM. (EDIBLE.)

COPRINUS ATRAMENTARIUS. (EDIBLE.)

FIG. 1.—COPRINUS FIMETARIUS. (EDIBLE.)

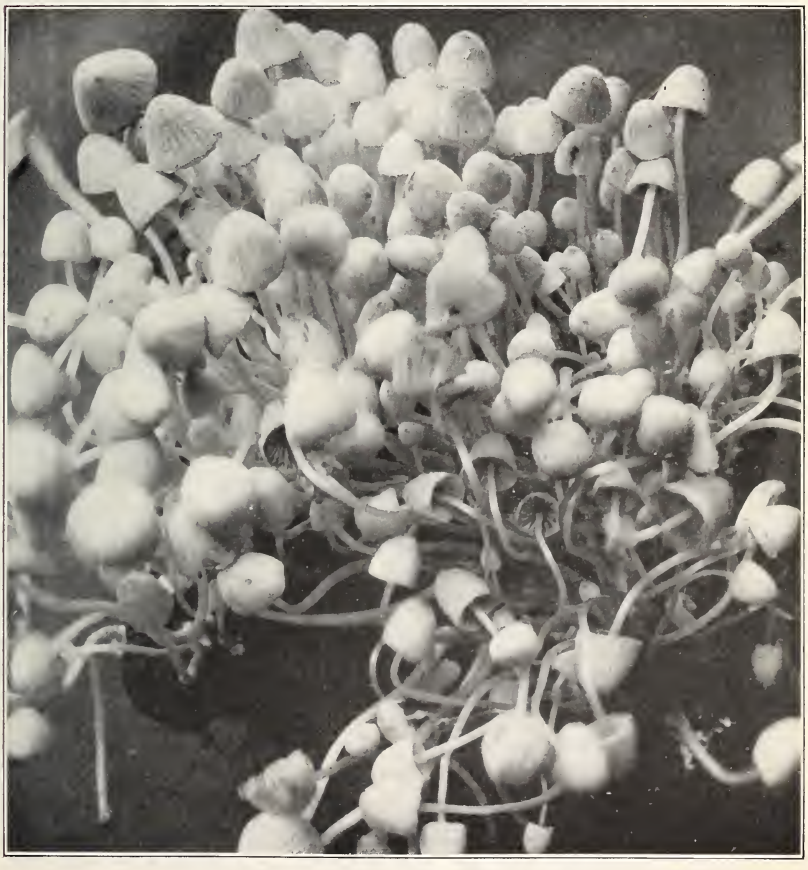

FIG. 2.—PSATHYRELLA DISSEMINATA. (EDIBLE.)

FIG. 1.—COPRINUS MICACEUS. (EDIBLE.)

FIG. 2.—PANAEOLUS RETIRUGIS. (EDIBLE.)

FIG. 1.—FISTULINA HEPATICA. (EDIBLE.)

FIG. 2.—BOLETUS FELLEUS.

FIG. 1.—HYDNUM ERINACEUM. (EDIBLE.)

FIG. 2.—STROBILOMYCES STROBILACEUS.

PANAEOLUS.

In the genus Panaeolus the cap is slightly fleshy and the margin nonstriate, always extending beyond the gills, which are gray and mottled from the falling of the black spores. The stem is without a ring and polished. The two nearest related genera are Psathyrella and Coprinus. From the first Panaeolus is separated by the nonstriate margin of the cap and from Coprinus by the nondeliquescent gills.

Panaeolus retirugis. (Edible.)

Cap ovate, conic, slightly expanding, almost hemispherical, cream to tan colored, becoming grayish and dark smoky, viscid in wet weather, irregularly marked with anastomosing wrinkles; remnants of **veil,** which is prominent and firm in young plants, adhering as fragments on margin of mature caps; **gills** rather broad, ascending, adnexed, grayish to violet black; **stem** color of cap, darker in lower part, hollow, smooth, granulate, may be slightly bulbous.

Cap three-fourths inch to 1½ inches broad; stem 2 to 4 inches long, 2 to 3 lines thick. (Pl. XXX, fig. 2.)

This species is to be found on dung or on richly manured lawns. It seldom occurs in sufficient quantity to be cooked alone, but the flavor is pleasant and readily imparted to other mushrooms. The appendiculate character of the veil is of assistance in distinguishing this species from others of the genus.

POLYPORACEÆ (pore fungi).

Members of the family Polyporaceæ are characterized by the production of a poriferous fructification. In Agaricaceæ the spores are developed on gills, while in Polyporaceæ they are formed in numerous more or less minute tubes on the lower surface of the fruiting body (hymenophore). The tubes may be short or elongated, the mouths (pores) round, angular, or compressed.[1] In some genera the hymenium is wrinkled and the tubes are reduced to mere pits. Great variation is also to be observed in the consistency of the fruiting body; it may be woody, fleshy, coriaceous, or subgelatinous. The key that follows will aid in distinguishing the genera of Polyporaceæ discussed in this paper.

Key to Polyporaceæ.

Hymenophore normally pileate, sometimes with resupinate forms:
- Stratum of tubes easily separable from the hymenophore, stem central—
  - Cap smooth ..... Boletus.
  - Cap with large scales ..... Strobilomyces.
- Stratum of tubes distinct from the hymenophore, but not separable from it—
  - Tubes in several layers, woody, perennial ..... Fomes.
  - Tubes not stratose—
    - Cap thick ..... Polyporus.
    - Cap thin ..... Polystictus.
    - Cap fleshy, tubes crowded ..... Fistulina.

[1] The tubes and contour of the mouths may be readily determined by the aid of a small hand lens.

Hymenophore sessile, corky, tubes sinuous and labyrinthiform.....DAEDALEA.
Hymenophore reflexed, resupinate or amorphous, subgelatinous, hymenium plicate or rugose porous.....MERULIUS.

BOLETUS.

In general appearance, namely, the pileate and stipitate character of the plants, the species of the genus Boletus resemble members of the Agaricaceæ. The important difference is the fact that the spores, instead of being developed on gills, are borne in numerous small tubes, which are closely crowded but easily separable from one another and from the hymenophore.

Most of the plants of this genus are terrestrial, but occasionally they are to be found growing upon wood. Some species are edible and considered exceedingly good, while others are extremely dangerous. The phenomenon of changing color on exposure to air exhibited by certain species is not a character peculiar to either poisonous or edible varieties.

Key to species of Boletus.

Surface of hymenium yellow, orange, or greenish.
- Ring present:
  - Cap yellow.....*B. luteus.*
  - Cap brown when moist, yellowish when dry—
    - Stem long, granulated.....*B. granulatus.*
    - Stem short, not or rarely granulated.....*B. brevipes.*
- Ring absent:
  - Flesh not changing color—
    - Mouths of tubes white becoming tinged with flesh color...*B. felleus.*
    - Mouths of tubes white becoming yellow and greenish.....*B. edulis.*
  - Flesh or tubes or both changing color—
    - Tubes adnate or sinuate, depressed, tinged with green....*B. badius.*
    - Tubes free, yellow, mouths bright red, orange colored in age.....*B. satanus.*
    - Tubes subadnate, large, angular, flesh red immediately beneath the cuticle, changing to blue where wounded.*B. chrysenteron.*
    - Tubes adnate, small, subrotund, bright yellow, changing to blue where wounded.....*B. bicolor.*

Boletus bicolor. (Edible.)

Cap convex, glabrous, pruinose, dark red, paler in age and sometimes spotted with yellow, firm; **flesh** yellow, sometimes changing to blue where wounded; **tubes** nearly plane, adnate, bright yellow, changing to blue where wounded, mouths small angular or subrotund; **stem** subequal, solid, red, generally yellow at the top.

Cap 2 to 4 inches broad; stem 1 to 3 inches long.

A very attractive little species, occurring quite commonly in Virginia and Maryland in the woods and on lawns in shady places. It is considered one of the best edible species.

Boletus chrysenteron.

Cap convex or plane, brown or brick red, more or less cracked, subtomentose; **flesh** yellow, red immediately beneath the cuticle, slightly changing to blue where wounded; **tubes** subadnate, yellow then greenish, large, angular; **stem** fibrous, equal, red or yellowish.

Cap 1 to 3 inches broad; stem 1 to 3 inches long.

Authors differ concerning the edibility of this species; consequently extreme caution should be used to avoid collecting it for *Boletus bicolor*, which is edible.

Boletus edulis. (Edible.)

Cap convex to expanded, smooth, firm when young, becoming soft in age, the color varying from grayish red to brownish red, generally paler on the margin; **flesh** white or yellowish, sometimes reddish beneath the cuticle; **tubes** convex, nearly free, long, minute, white, then yellow and greenish; **stem** variable in length, straight or flexuous, equal or bulbous, more or less reticulated, whitish, pallid, or brownish.

Cap 4 to 6 inches broad; stem 2 to 6 inches long.

A species of frequent occurrence and the one most commonly eaten of this genus.

Boletus felleus.

Cap convex or nearly plane, firm, becoming soft, color variable, pale yellowish, grayish brown, reddish brown, or chestnut; **flesh** white, often changing to flesh color when wounded, taste bitter; **tubes** adnate, long, depressed around the stem, mouths angular, white, becoming tinged with flesh color; **stem** similar in color to the cap, but paler, variable, long or short, equal or tapering upward, sometimes bulbous, reticulated above.

Cap 3 to 4 inches broad; stem 2 to 3 inches long. (Pl. XXXI, fig. 2.)

This is a common and widely distributed species. It is exceedingly attractive on account of its color, size, and solidity; though not poisonous, it is so bitter that a small quantity renders a whole dish unpalatable.

A variety, *Boletus felleus obesus*, attains a size of about a foot in diameter and has coarse reticulations on the stem.

Boletus granulatus.

Cap convex or nearly plane, viscid or glutinous and rusty brown when moist, yellowish when dry; **flesh** pale yellow; **tubes** short, adnate, yellowish, mouth granulated; **stem** pale yellowish, dotted above.

This species is considered edible by most authors, but it is not attractive on account of the viscid character of the cap.

A nearly related species, *Boletus brevipes*, is distinguished from *B. granulatus* by a shorter stem and the absence of granulations on the mouths of the tubes.

Boletus luteus. (Edible.)

Cap convex, becoming nearly plane, viscid or glutinous when moist, dull yellowish to reddish brown, sometimes streaked or spotted; **flesh** whitish or dull yellowish; **tubes** adnate, minute, yellow becoming darker with age; **stem** stout, pale yellowish, brownish or reddish, dotted above the annulus; annulus variable, sometimes persisting as a narrow ring and again appearing as a broad collar.

Cap 3 to 4 inches broad; stem $2\frac{1}{2}$ to 3 inches high.

An excellent edible species of wide geographic distribution, occurring commonly in pine woods.

A very similar species is *Boletus subluteus*, which is ornamented with dots both above and below the annulus. This fungus is also considered edible.

STROBILOMYCES.

The genus Strobilomyces closely resembles Boletus, but it may be distinguished by the less easily separable tubes and extremely scaly cap and stem.

Strobilomyces strobilaceus.

Cap hemispherical or convex, shaggy from numerous coarse, blackish scales, margin more or less appendiculate from the scales and fragments of the veil, which covers the tubes in the young plant; **flesh** at first whitish, changing to reddish, then blackish where wounded; **tubes** adnate, at first whitish, becoming blackish with age, mouths large, angular, changing color like the flesh; **stem** even or tapering above, sulcate at the top, scaly, colored like the cap.

Cap 2 to 4 inches broad; stem 3 to 5 inches long, 4 to 10 lines thick. (Pl. XXXII, fig. 2.)

This fungus occurs commonly in woods and along roadsides, singly, in small groups, or occasionally cespitose, from early summer until autumn. It is considered edible, but is not attractive.

FOMES.

The genus Fomes is distinguished among the Polyporaceæ by the hard, woody character of the species. The hymenophore is bracket shaped; the tubes are much elongated and stratified, one stratum developing annually. Fomes contains no edible species, but comprises many serious tree-destroying forms.

Fomes applanatus.

Cap smooth, cinnamon brown, becoming hoary, horizontal, flattened, shelflike, concentrically zoned, semicircular, broadly attached, margin thickened, first white, later becoming brown; hymenium flat, pores small, mouth white, changing to brown when bruised; internal structure of fibrous-spongy texture, brown in color.

Cap 2½ to 8 inches broad, 2 inches or more thick.

This species is perennial and of common occurrence on various deciduous trees.

Fomes lucidus.

Cap horizontal, irregularly kidney shaped, blood red, surface uneven, coarsely grooved, polished, corky, light in weight; **stem** lateral, length variable, polished, same color as the cap; **tubes** small, white, then tan.

Cap 2 to 6 inches broad.

This fungus is of wide distribution and quite common occurrence, appearing on logs and trunks. It is easily recognized on account of the varnished appearance of the cap and stem.

POLYPORUS.

Species belonging to the genus Polyporus present considerable variation in stem, form, and texture. The stem may be central, excentric, or absent, the hymenophore circular, reniform, or hoof shaped, azonate or grooved, and the substance fleshy, soft, corky, or woody. This genus is distinguished from Polystictus by the thicker cap and from Fomes by the nonstratose pores. Species of this genus are widely distributed, and representatives may be found from the North to the Tropics. Polyporus contains a few edible species and many wound parasites, species injurious to economic and ornamental trees. Wound parasites are fungi which have gained entrance to the interior of a tree or host through some unprotected surface resulting from lightning, insect attack, injudicious pruning, or some other agency.

Polyporus betulinus.

Hymenophore tough and fleshy, then corky, hoof shaped, umbonate at point of attachment, margin thickened, obtuse incurved, white when young, later brown to brownish red, zoneless, smooth; **pores** minute, short, unequal, whitish.

This fungus is of common occurrence on birch trees, measuring from 3 to 8 inches or more in width. When young it is considered edible, but possesses a rather strong flavor. It is often used as material for outdoor sketching, for which purpose it is very well adapted.

Polyporus frondosus.

This species occurs in large tufts, which measure 6 inches to over a foot in breadth. The **caps** are very numerous, crowded and overlapping, 1 to 2 inches in diameter, irregular in shape, curved, repand, lobed or cleft, brown or sooty gray; **stems** indefinite, branching or confluent; **pores** very small, white.

A very common plant, growing about stumps, roots, and trunks. It is edible, tender when young, but soon becomes tough.

Polyporus gilvus.

This plant possesses no value as an article of diet, but as a species frequently encountered by collectors its identity is of interest. Its specific name refers to the color, and the fungus is often referred to as the rust-brown Polyporus. The **caps** vary from 2½ to 4½ inches in width; the **pores** are brown, round, and minute.

Polyporus sulphureus.

This is a very conspicuous fungus on account of its large clusters and the characteristic sulphur-yellow color of the species. The **caps** are fleshy, spongy, attached laterally, very much imbricated, more or less fan shaped, smooth, even when young, later ridged and furrowed; margin at first thick and blunt, becoming thinner; **pores** very small, plane, and sulphur yellow.

This species occurs abundantly and is edible, though of doubtful value. It is of interest as a wound parasite on various trees, gaining access to the interior of a tree through an exposed surface and finally causing the death of the host.

POLYSTICTUS.

Species of the genus Polystictus may be distinguished from those of Polyporus by being thinner and more pliant. None are to be especially recommended for table purposes, but by their abundance and attractiveness they force themselves upon the attention of the amateur or any one interested in natural history. All the species described here are sessile and shelving.

Polystictus cinnabarinus.

The specific name of this plant is derived from its bright cinnabar color. The fungus is shelving, pliant, and rather thicker than the following species. It grows on dead logs or dead branches of various trees.

Caps 1 to 3 inches in width.

Polystictus pergamenus.

This fungus is thin and very pliant when fresh, somewhat tomentose, with indistinct, longitudinal color zones. The **tubes** are violet or purplish, but the plants are easily weathered and the tubes become lacerated, resembling Irpex, a genus possessing teeth instead of tubes.

Caps 1 to 1½ inches in width.

Polystictus versicolor.

Polysticus versicolor is easily distinguished by the concentric bands of different colors, mostly bay or black, which mark the cap. The **tubes** are white, and the margin thin, sterile, and entire. The plants grow densely imbricated and are to be found abundantly on dead stumps or trunks of many varieties of trees.

Caps three-fourths inch to 1½ inches in width.

FISTULINA.

In the genus Fistulina the stem is lateral or very short, the fruiting body growing horizontally from trunks of living trees or stumps of recently cut trees. It is distinguished from Boletus and Polyporus by the tubes, which are separate from one another and closed at the mouth when young.

Fistulina hepatica. Beefsteak fungus. (Edible.)

Specimens of this species are always shelving and may be sessile or stipitate. The **caps** are subspatulate, the margin entire, wavy or scalloped, blood red, and at maturity marked with more or less radiating lines. The **flesh** is red, thick, soft, juicy, and traversed by tenacious fibers. The **tubes** are at first short and yellowish, becoming elongated and discolored in age.

Caps 3½ to 8 inches broad, reported as attaining in England a weight of 30 pounds. (Pl. XXXI, fig. 1; from C. G. Lloyd.)

This fungus is variously known as the beefsteak fungus, beef tongue, oak tongue, or chestnut tongue. It grows from decaying crevices of certain deciduous trees, such as the oak and chestnut, but preferably the chestnut. This species is widely distributed and has an international reputation for its edibility.

DAEDALEA.

The plants belonging to the genus Daedalea are sessile, dry, and corky. The species are exceedingly interesting on account of the hymenophore, which shows intermediate stages between the gill and pore fungi. The pores are typically sinuous and labyrinthiform, but often the thick platelike developments simulate gills more than pores. Several species are of common occurrence, but all are tough and corky and none reported edible.

Daedalea quercina.

Cap shelflike, dimidiate, triangular in cross section, corky, rigid, smooth or nearly so, wrinkled, grayish to light brownish, margin usually thin, pallid; **pores** wavy, some gill-like.

Caps 2 to 4½ inches or more in width.

This species occurs on oak (Quercus) stumps and trunks, and because of its habit of growing on this host it was named *Daedalea quercina*.

MERULIUS.

The species of the genus Merulius are resupinate and subgelatinous. The hymenium is wrinkled or foldlike and the pores are very shallow.

Species of Merulius are very troublesome and destructive in dwellings constructed wholly or in part of timber. Attacks by these fungi are common where the light and ventilation are poor, as in cellars, basements, and similar places.

Merulius lacrymans.

In *Merulius lacrymans* the fruiting body is flat, prostrate, soft, and characterized by watery exudations. It is at first white, then red, later changing to yellowish brown. This is one of the most common species which attacks timber and renders it spongy, watery, and unfit for building purposes. The mycelium may develop as long strands, or it may form large sheets which peel off readily.

HYDNACEÆ.

The plants in the Hydnaceæ are stipitate, bracket shaped or resupinate, fleshy, corky, leathery, or woody. In Hydnum, the most highly developed genus of this family, the hymenium is distinctly toothlike, but there are many intermediate gradations, from scattered granules or small hemispherical prominences to toothlike developments. In all having teeth, the processes are directed downward.

Key to Hydnaceæ.

Hymenium of distinct, awl-shaped teeth or spines, resupinate or with central stem:
  Plants fleshy.....HYDNUM.
  Plants woody.....ECHINODONTIUM.
Hymenium with teeth united (connected at the base by slightly raised folds), teeth not so acute as in Hydnum.....IRPEX.
Hymenium with coarse, blunt tubercles, subcylindrical, resupinate..RADULUM.

HYDNUM.

The species of the genus Hydnum vary greatly as to form, consistency, and manner of growth. Certain forms possess well-defined cap and stem, some are bracket shaped or shelving and still others are resupinate. The teeth are pointed and free from each other at the base. In consistency, species of Hydnum range from soft fleshy to almost woody. They may be terrestrial in habit or may grow on living or dead trees.

Hydnum coralloides. (Edible.)

This species is easily recognized by the long, interlacing tapering branches, which are of two kinds: The primary, which are nearly sterile; and the secondary, which are fertile and chiefly bear the slender terete teeth. The substance is fleshy, brittle to somewhat tough. *Hydnum coralloides* is one of the most graceful and beautiful species of fungi, and its white, corallike tufts measure from 6 to 18 inches across. It grows on standing or prostrate timber in a stage of decay and is found from August until frost. It is edible, but not very abundant or common.

Hydnum erinaceum. Satyr's beard. (Edible.)

This species forms pendulous tufts from 2 to 10 inches across. The point of attachment is small and the mass generally projects horizontally from the substratum. The tufts are white, changing to yellowish brown in drying. The individual teeth are crowded, slender, terete, tapering acute, 1 to 2½ inches long. This species is quite conspicuous, often growing from crotches or wounds of trees—beech, oak, locust, etc. (Pl. XXXII, fig. 1.)

Hydnum imbricatum.

In this species the plants are terrestrial and provided with a stipe. The **cap** is convex and nearly expanded, fleshy in the center, thinner toward the margin, surface scaly, especially toward the center. The scales may be imbricated, sometimes zonately arranged, or the flesh broken up in a tessellated manner. The cap varies from mouse color to dark brown, with the stem of the same color. The **teeth** are coarse, terete, tapering, light brown to ashy. *Hydnum imbricatum* is of fairly wide geographic range and grows on the ground, especially in pine and chestnut woods. It is edible, but slightly bitter. (Pl. XXXIII, fig. 1; from F. E. Clements.)

Hydnum repandum.

This species is also terrestrial and the stem central or excentric. The **cap** is more or less irregular, margin repand or wavy, color variable, ranging from light buff to brown or reddish; **flesh** whitish, compact, and fragile. The **teeth** are white, conical, and brittle. The **stem** is thick, even or clavate. *Hydnum repandum* is quite common and may be found from July to November in woods on the ground, or sometimes on much-decayed stumps. It is edible and considered very good.

Hydnum septentrionale.

In this species the **caps** are shelving, imbricated, and arranged in horizontal layers, smaller at the top and bottom and larger in the center. The surface is irregular, somewhat rugose, azonate, and white to brownish. The **spines** are crowded, terete to subangular, one-half to three-fourths inch long. This species occurs on various deciduous trees (Fagus, Acer, Ulmus, Nyssa), often attaining considerable size. The edges of the young plant are said to be edible, but they have little flavor. (Pl. XXXIII, fig. 2.)

IRPEX.

The genus Irpex has no species of great interest to the mycophagist, but several common forms are apt to attract the attention of the amateur collector. Irpex may be distinguished from the preceding genus by the teeth being connected at the base and being less awl shaped than in Hydnum.

Irpex fusco-violaceus.

The plants of this species are grayish, effuso-reflexed, thin, and coriaceous; **teeth** in irregular rows, platelike, incised at the apex, violet brown. The technical description of this fungus mentions the silky character of the cap, but most specimens appear tomentose or tomentose-villose. *Irpex fusco-violaceus* is very common on decaying coniferous trees.

TREMELLACEÆ (jelly fungi).

Members of the family Tremellaceæ are typically gelatinous or sometimes waxy, horny when dry, reviving when wet. The plants are irregular in form, almost amorphous, usually stemless, globose or brainlike. The hymenium is smooth; that is, does not develop into gills, tubes, or teeth, except in one genus, Tremellodon. Most of the forms are found on wood; some are edible but not especially good.

Key to Tremellaceæ.

Fruiting body membranaceous, rigid and cartilaginous when dry, reviving when moist, hymenium gelatinous, ear shaped, attached to a narrow base.....HIRNEOLA.

Fruiting body cerebriform, or forming foliaceous, sessile tufts.....TREMELLA.
Fruiting body cup shaped or forming irregular masses.....EXIDIA.
Fruiting body substipitate, somewhat spatulate, bifurcate, gelatinous, cartilaginous, the two surfaces different, hymenium unilateral.....GUEPINIA.
Fruiting body very gelatinous, bearing crowded, acute spines on the under surface.....TREMELLODON.

HIRNEOLA.

Species of the genus Hirneola are irregularly cup shaped, earlike, soft and subgelatinous when wet, horny when dry, veined or wrinkled.

Hirneola auricula-judae.

This species is commonly known as Jew's-ear, on account of its resemblance to the human ear. It occurs singly or grouped, and varies in size from 1 to 2 inches across, and in color from brown to black. *Hirneola auricula-judae* is found on decaying wood of various trees, but is reported as exhibiting a preference for elms. It is extensively used in China, where it is made into soup. (Pl. XXXIV, fig. 2; from C. G. Lloyd.)

TREMELLA.

In the genus Tremella the substance is gelatinous, tremulous, convoluted, or effuse, and the hymenium covers the entire upper surface of the plant. The species are most commonly found growing on rotting wood, sometimes on the ground, and occasionally parasitically, as, for instance, the species *Tremella mycetophila* on *Collybia dryophila*. Members of this genus are reported as harmless, but as their water content is large and their nutritive value small, they are not to be highly recommended as an article of diet.

Tremella frondosa.

This species consists of many contorted, twisted, leaflike lobes, united at the middle and base. It is described as pinkish yellow, but the collector will often find it cream buff. *Tremella frondosa* is said to be the largest species of the genus, often attaining a size of 4 to 6 inches in diameter and slightly less than that in height. It occurs during the summer and early fall on decaying wood.

EXIDIA.

The species of most common occurrence in this genus is *Exidia glandulosa*, commonly called witches' butter. In wet weather it appears as an exceedingly gelatinous, amorphous mass, brown to black in color, and varying in size from one-half to 1 inch in width. In dry weather it persists as a black incrustation on fallen limbs or trunks. It is an autumnal species, but persists through the winter.

GUEPINIA.

The species of the genus Guepinia are gelatinous when moist and cartilaginous when dry. In the latter condition they are shriveled and very much reduced in size. The hymenium is developed on only one side of the sporophore.

Guepinia spathularia.

In rainy or damp weather this little fungus forces itself upon the attention of the collector. It occurs abundantly, especially upon railroad ties. Plants arise from a stemlike base, are spatulate, lobed, and branched, one-half to 1 inch in height, yellow or orange. In damp weather they are subgelatinous to membranaceous, in dry weather horny to cartilaginous. After a rain these little fungi appear suddenly and are conspicuous, but they soon shrivel, becoming insignificant. The species has no value from an epicurean point of view.

TREMELLODON.

The genus Tremellodon can not be confused with any other, as it is the only gelatinous spiny fungus known.

Tremellodon gelatinosum.

Specimens are somewhat stipitate, tremulous, dimidiate, fan shaped; **cap** opalescent, roughened with small dots; **teeth** soft, white. They grow on decaying logs in damp woods in the fall and early winter, and are considered delicious when slowly stewed.

CLAVARIACEÆ (coral fungi).

In the family Clavariaceæ the plants are erect, simple, mostly club shaped, and variously branched. The hymenium covers both the side and upper surfaces.

Many beautiful plants belong to this family, which owes its name to the corallike appearance of many of its species. The color also adds to the beauty of the plants, which may be lavender, orange, yellow, pink, red tipped, cream, or white. Many species are edible; but, since cases of poisoning have been reported, the indiscriminate eating of Clavariaceæ is not to be advised.

Key to Clavariaceæ.

Plants much branched, branches compressed, platelike, crisped.....SPARASSIS.
Plants club shaped and simple or variously branched, stem not distinct from the hymenophore.....CLAVARIA.

Sparassis crispa. Leaf coral. (Edible.)

This fungus forms a rosette, or tuft, which springs from a thick, rootlike base, and is composed of flat, thick, leaflike, revolute, white, or yellowish branches. The specific name was suggested by the curly character of the branches. Specimens are gelatinous waxy in consistency and retain their form fairly well when dried. The species is considered very delicious.

The plants vary from 4 to 10 inches broad and 2½ to 7 inches high.

Clavaria pistillaris. (Edible.)

Clavaria pistillaris, unlike many species of Clavaria, is not crowded or corallike. It consists of a club-shaped body, yellowish, ochraceous, or brownish, with flesh white and spongy and exterior smooth or wrinkled.

It grows to a height of 2 to 6 inches or more and is 1 or more inches thick.

This fungus is found growing in mixed woods, preferably damp, mossy locations, and by some authorities is considered one of the best edible varieties.

GASTEROMYCETES.

Key to Gasteromycetes.

Developed under ground, at first inclosed in a universal volva consisting of three distinct layers, the outer firm and elastic, the second gelatinous, and the inner thin and delicate.....PHALLACEÆ.
Developed above ground, peridium consisting of two or more distinct layers, usually globose to pyriform, with a mouth or irregular opening, spores a powdery mass at maturity with well-developed capillitium.....LYCOPERDACEÆ.
Developed at the surface of the ground, peridium dehiscing irregularly by the splitting or decay of the upper part, capillitium absent.....SCLERODERMACEÆ.
Developed above ground, peridium at first partly closed, funnel-shaped to cup shaped, containing one to many sporangioles.....NIDULARIACEÆ.

PHALLACEÆ (*stinkhorn fungi*).

Most of the species belonging to the family Phallaceæ are characterized by a disagreeable odor. The plants grow below the surface of the ground or on decayed stumps. The mycelium, or vegetative part, forms coarse, ropelike strands from which the fruit body arises and which in its early stages is commonly known as an "egg" because of its form. The outer part of the egg forms the volva and consists of outer and inner membranes, between which is a gelatinous substance. The central portion of the egg is occupied by a tubular receptacle or part bearing the gleba (hymenium). The receptacle elongates rapidly and at maturity ruptures the volva, thus exposing the spore-bearing mass. Species of this family have highly developed characters, such as color, taste, and odor, which, by attracting insects, insure the dissemination of the spores.

Key to Phallaceæ.

Receptacle with hanging cap:
  Gleba borne on a special cap—
    Stalk with an appendage extending below the cap.....DICTYOPHORA.[1]
    Stalk without an appendage.....ITHYPHALLUS.
Receptacle without hanging cap:
  Gleba borne on the upper portion of the stalklike receptacle.....MUTINUS.

DICTYOPHORA.

The name Dictyophora, meaning net bearer, is descriptive of the delicate netlike appendage, a character peculiar to this genus, but more or less conspicuous in the different species. The stalklike receptacle consists of spongy, cellular tissue. The species here discussed are of fairly wide and common occurrence.

[1] By some authorities, Dictyophora and Ithyphallus are described under the generic name Phallus, of which *Phallus impudicus* is the common type.

Dictyophora duplicata.

Dictyophora duplicata is from 6½ to 9 inches high, with cap about 2½ inches in diameter and the stem one-half to three-fourths inch in thickness. The **cap** is campanulate, and after the deliquescence of the gelatinous gleba appears recticulate pitted. The long white **veil**, which is sometimes entire but often torn and shreddy, is pendulent and consists of coarse, thick threads. *Dictyophora duplicata* is considered edible if used before the volva has ruptured, and when cut in slices and fried or stewed it is said to be fairly good. (Pl. XXXV, fig. 1; from J. B. Rorer.)

Dictyophora ravenelii.

This species is readily distinguished from the preceding by the more slender stem and the conico-bell-shaped **cap**, which is wrinkled after the disappearance of the gleba and does not present prominent reticulations. The **veil** is membranaceous and not conspicuously netlike, as in *Dictyophora duplicata*. (Pl. XXXVI, figs. 2 and 3; from G. F. Atkinson.)

ITHYPHALLUS.

The genus Ithyphallus is similar to Dictyophora, but differs in not having a netlike veil.

Ithyphallus impudicus.

The **volva** is globose or ovoid, white or pinkish, 2 to 3 divided. The **cap** is conic to campanulate, the surface reticulate pitted, apex smooth, and the stalk cylindric-fusiform, hollow, and widely perforate at the apex. This is a very common species, and is found in considerable numbers about dead stumps, fence corners, yards, etc. Its presence is readily detected by the strong, disagreeable odor which it emits when mature. Mr. C. G. Lloyd, from his study and observations of types, considers our American form a variety of *Ithyphallus impudicus* on account of the pink volva, and he states that we do not seem to have the type form with the white volva. (Pl. XXXVII, fig. 2.)

MUTINUS.

In the genus Mutinus the receptacle or stalk is cellular or spongy, simple, elongated, cylindric tapering, with the gleba-bearing portion definite. The species of Mutinus are very similar in general form and color, but are mainly separated by the character of the cellular structure of the receptacle and the separation between gleba and stem. The two species most commonly found are here described.

Mutinus caninus.

Stipe hollow, perforate or imperforate, fusiform, white or reddish; spore-bearing portion flesh colored, sharply defined, cellular structure not uniform; e. g., the cells or minute chambers composing the stem are larger than those of the gleba-bearing portion.

Mutinus elegans.

Stipe hollow, perforate, tapering from base, white or pinkish; spore-bearing part red not sharply defined, cellular structure uniform.

LYCOPERDACEÆ.

Key to Lycoperdaceæ.

Peridium with or without a sterile base, outer layer spiny, warty, or papery:
- Dehiscence regular by apical mouth ..... LYCOPERDON.
- Dehiscence irregular ..... CALVATIA.

FIG. 1.—HYDNUM IMBRICATUM.

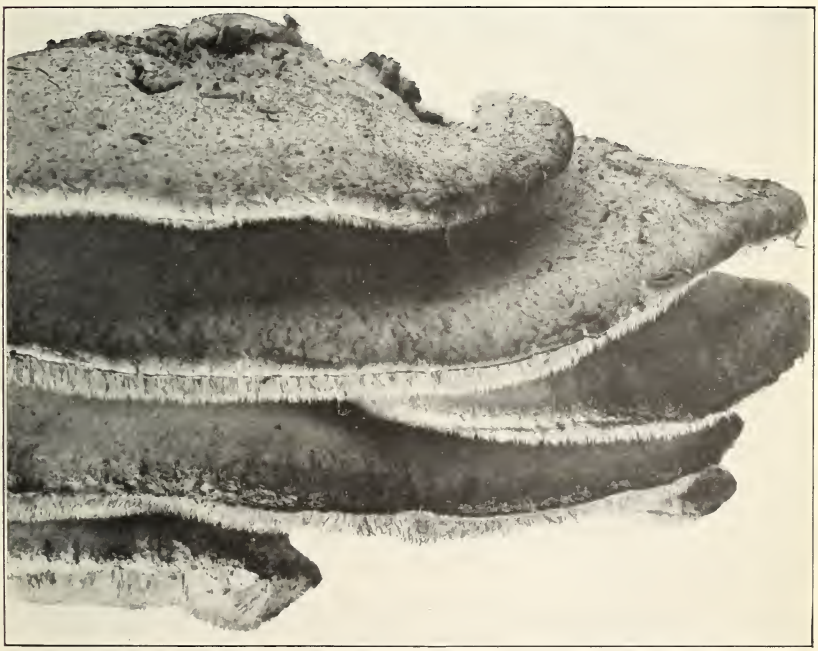

FIG. 2.—HYDNUM SEPTENTRIONALE.

FIG. 1.—LYCOPERDON PYRIFORME. (EDIBLE.)

FIG. 2.—HIRNEOLA AURICULA-JUDAE.

FIG. 1.—DICTYOPHORA DUPLICATA.

FIG. 2.—MORCHELLA ESCULENTA. (EDIBLE.)

FIG. 1.—GEASTER RADICANS.

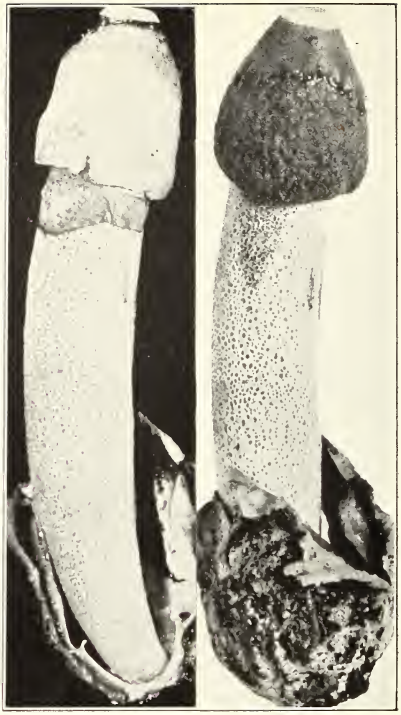

FIG. 2.—DICTYOPHORA RAVENELII (MATURE SPECIMEN).

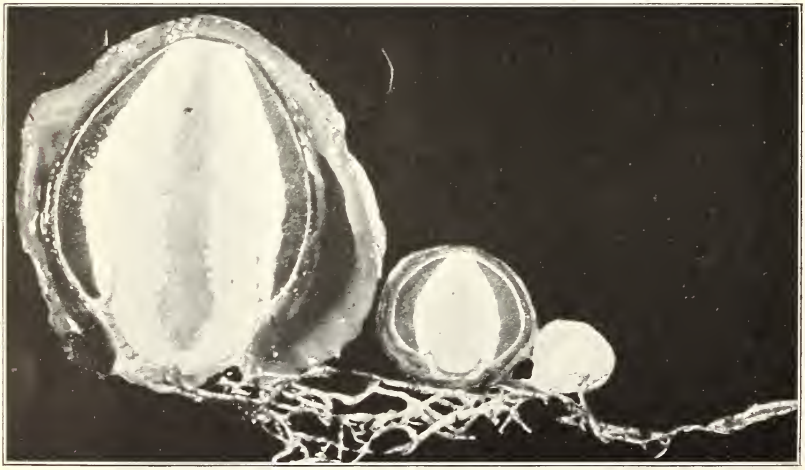

FIG. 3.—EGGS OF DICTYOPHORA RAVENELII.

FIG. 1.—BULGARIA INQUINANS.

FIG. 2.—ITHYPHALLUS IMPUDICUS.

FIG. 1.—LEOTIA LUBRICA.

FIG. 2.—CALVATIA GIGANTEA. (EDIBLE.)

Peridium without a sterile base:
Dehiscence apical or irregular.....Bovista.
Dehiscence basal, mouth visible only after rupture of outer peridium.....Catastoma.
Peridium (outer) splitting into stellate segments.....Geaster.

LYCOPERDON.

Species of the genus Lycoperdon are small puffballs with a somewhat thickened base and fibrous rooting mycelium. The peridium consists of two layers. The outer, the cortex, breaks up into small, soft scales, spines, warts, or granules which may soon disappear; the inner, the true peridium, is smooth, thin, and membranaceous, and opens by an apical mouth. When young the interior of the plants is white, soft, and firm; as they become old it changes to yellow and finally forms a purplish brown, dusty mass, composed of spores intermingled with threadlike filaments known as the capillitium. A central columella may be formed by a portion of the capillitium which extends into the upper part of the plant.

All the species of this genus are considered edible if collected while the interior is firm and white; the flavor, however, is inferior to that of large puffballs. Species of Lycoperdon are common on the ground or on old stumps or logs, generally clustered, and appearing in the summer and autumn.

Lycoperdon gemmatum. (Edible.)

Plants top shaped or with a subglobose head on a stout, cylindrical base, white, becoming gray or grayish brown; outer wall, the cortex, consisting of long pointed spines each surrounded by a ring of minute warts. The spines fall away, leaving scars on the inner layer of the peridium. The sterile portion usually occupies more than half the interior of the plant. The spore mass is greenish yellow to pale olive brown. The plant is 1 to 2 inches in height and 1 to 1½ inches in diameter.

This species appears on lawns and is common on the ground in woods.

Lycoperdon pyriforme. (Edible.)

Plants obovate, pear shaped or subglobose, dingy white or brown; cortex of minute, persistent warts or scales, inner coat smooth; sessile or with a short stemlike base and with white rootlike fibers; columella present; capillitium and spores greenish, yellow, then olivaceous. The plants are 1 to 2 inches in height and about 1 inch in diameter. (Pl. XXXIV, fig. 1.)

A very common species, appearing in dense clusters on rotten stumps or logs.

CALVATIA.

The genus Calvatia contains puffballs of the largest size. It differs from Lycoperdon in the absence of an apical mouth and a regular method of dehiscence. The plants are terrestrial, globose, or top shaped, usually with a thick, cordlike, rooting mycelium. The cortex is thin, smooth, or covered with minute squamules.

The most delicious species of puffballs belong to this genus, but as in all fungi of this class, they must be eaten while the interior is perfectly white. If old they are disagreeable and indigestible.

Calvatia cyathiformis. (Edible.)

Plant globose or turbinate and depressed above, with a thick, somewhat stemlike base and cordlike root; cortex whitish gray or brown, sometimes with a pinkish purple tinge, thin, fragile, areolate in the upper part, which, after maturity, soon breaks up and falls away, leaving a cup-shaped base with a ragged margin attached to the ground; the capillitium and spores are at first violet, becoming dark purple-brown. The plant is 3 to 6 inches in diameter.

Common on open grassy ground in pastures, fields, and lawns; edible and of fine flavor.

Calvatia gigantea. Giant puffball. (Edible.)

Plant globose or obovoid, nearly sessile; plicate at base with cordlike mycelial strands. Cortex at first white and smooth, becoming yellowish or brown, sometimes slightly roughened by minute warts or sometimes cracking in areas; inner peridium thin and fragile; capillitium and spores when mature yellowish green to dingy olive.

The plants are generally 10 to 20 inches in diameter. Individuals of this species often attain an enormous size, the specimen shown in the accompanying illustration measuring 5 feet 1 inch in circumference. (Pl. XXXVIII, fig. 2.)

An excellent edible species, cosmopolitan and abundant, growing on lawns, pastures, and meadows.

BOVISTA.

Species of the genus Bovista are globoid, the peridium consisting of two walls: The outer, the exoperidium, thin, smooth, friable, having mostly disappeared at maturity; the inner, the endoperidium, thin, parchmentlike, opening irregularly or by an apical mouth; capillitium consisting of branched, short, free threads.

This genus may be distinguished from Lycoperdon by the absence of a sterile base, by the easy separation from place of attachment, and by the fragile exoperidium, which soon disappears, except perhaps at the base. Owing to the spherical form of these plants and their tendency to break away from the point of attachment they are readily blown about and on this account are called "tumblers."

Bovista pila. (Edible.)

Plants globose or obovoid, sessile, without a thickened base; exoperidium thin, at first white, becoming brown, and breaking away in fragments toward maturity; inner peridium tough, smooth, shining, brown or purplish brown, with age becoming silvery gray, dehiscent by an irregular torn mouth at or near the apex; mass of spores and capillitium pale brown or olivaceous, becoming dark or purple brown. The plants are 1½ to 2½ inches in diameter.

"This Bovista is remarkably tough; it maintains its shape firmly and persists a long time; it breaks away from its root and rolls about over the old leaves before the wind even till the following season." (*Morgan, vol. 14, p. 145.*)

CATASTOMA.

Species of the genus Catastoma are thus described: "Puffballs growing just beneath the surface of the ground and connected immediately with it by filamentous threads, which issue from every part of the cortex; after maturity, when the peridium breaks away, the lower part of the outer coat is held fast by the soil, while the upper

portion which has attained the surface remains, covering the inner peridium like a cap or inverted cup; consequently, the apparent apex at which the mouth is situated is the actual base of the plant as it grows. The capillitium threads are similar to the densely interwoven hyphæ, which form the inner peridium and are evidently branches of them radiating from the interior." (*Morgan, vol. 14, p. 142.*)

Catastoma circumscissum.

Peridium subglobose, more or less depressed, and often quite irregular; cortex thickish, fragile, usually rough and uneven from the adhering soil, after maturity torn away, leaving the lower two-thirds or more in the ground; inner peridium depressed-globose, subcoriaceous, rather thin, pallid, becoming gray, minutely furfuraceous, with a small regular basal mouth. Mass of spores and capillitium soft, compact, then friable, olivaceous, changing to pale brown (fig. 1; from Morgan).

GEASTER (EARTH STARS).

In the genus Geaster the peridium consists of three persistent coats. The two outer coats generally adhere and form the thick, fleshy-coriaceous exoperidium, which at maturity splits from the apex into several segments; the inner coat, the endoperidium, is more or less parchmentlike, either sessile or short stalked, and opens by an apical mouth. The spores are usually dark brown and mixed with capillitium.

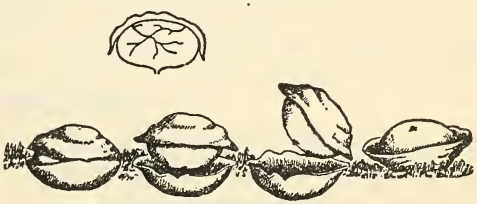

FIG. 1.—*Catastoma circumscissum,* showing method of growth, early and late stages. The cross section (at top) shows the origin of the threads of the capillitium. (After Morgan.)

The distinctive character of this genus is the stellate manner of dehiscence of the two outer layers. The segments thus formed vary from spreading, inrolled, or recurved to arched. The accompanying illustration (Pl. XXXVI, fig. 1) shows a form of the latter type in which the two layers of the exoperidium separate, the outer remaining as a segmented basal cup, while the inner layer becomes arched and causes the elevation of the endoperidium.

Geaster hygrometricus.

Peridium depressed globose; exoperidium splitting at the apex divides into a variable number of strongly hygrometric segments, which are rigidly inrolled when dry and expanded when moist; endoperidium whitish gray or brown, thin, membranaceous, with a small, irregular mouth.

Inner peridium three-fourths to 1 inch in diameter. Segments 6 to 20 in number, 2 to 3 inches in diameter when expanded.

Geaster hygrometricus is the species most frequently collected. It is common in woods, sandy locations, or partially cleared land. The peculiarity of this species is the hygroscopic nature of the exoperidium. In dry weather the segments are strongly recurved, but in wet weather they expand. This process may occur repeatedly, depending on weather conditions, and it is often called the "poor man's weather glass."

SCLERODERMACEÆ.

Fungi belonging to the family Sclerodermaceæ are developed at the surface of the ground. The peridium is generally thick, rough, warty, or scaly, but not composed of distinct layers. The representative genus of the family and the one most commonly observed by the amateur collector is Scleroderma.

SCLERODERMA.

In the genus Scleroderma the plants are sessile or nearly so. The peridial wall is generally thick, hard, and leathery, but it may be scaly or warty, indehiscent, or it may burst at the apex into stellate lobes. None of the species here described are highly recommended for edibility.

Scleroderma geaster.

Peridium mostly sessile, subglobose, coarse in texture, finally scaly, at length dehiscing in an irregularly stellate manner. These plants are at first dingy ocher in color, later becoming brown, the spore mass finally purplish brown. Specimens may be found from 2 to 3 inches in diameter. After dehiscence they often measure 4 to 5 inches across.

They are ordinarily found in sandy woods, banks, or bordering roadsides.

Scleroderma vulgare.

Peridium subsessile, subglobose, yellowish or pale brown, scaly or warty, plicate toward the base; spore mass purplish black.

Peridium 1 to 3 inches in diameter.

This species is very common and plentiful and is found in dry situations, on hard ground, along cinder paths and gravel walks.

A fungus nearly related to *Scleroderma vulgare*, considered by some authorities merely a variety, by others as a distinct species, is known as *Scleroderma verrucosum*. It differs from *S. vulgare* in possessing a thinner and more or less minutely warted peridium, in the umber color of the spore mass, and in the more pronounced stemlike development of the base.

NIDULARIACEÆ (*bird's-nest fungi*).

Members of the family Nidulariaceæ are represented by small, leathery, cup-shaped plants growing on old sacking, manure, earth, and decaying or dried wood. The common name is suggested by the form of the peridium, which is cup shaped and contains many small, lenticular bodies (peridiola) resembling eggs. The mouth of the peridium is at first covered by a membrane, which later becomes ruptured and exposes the sporangioles. The spore-bearing tissue and spores are never resolved into a dusty mass, as in many Gasteromycetes, but persist in the form of peridiola which contain the spores.

Key to Nidulariaceæ.

Peridium with several to many sporangioles:
  Peridium torn at the apex in opening—
    Sporangioles not attached to the inner wall of the peridium..... NIDULARIA.

Peridium with several to many sporangioles—Continued.
Peridium opening by a deciduous membrane—
Sporangioles attached to the inner wall of the peridium—
Peridium of three united layers and spores mixed with filaments..... CYATHUS.
Peridium of a single layer and spores not mixed with filaments..... CRUCIBULUM.

CYATHUS.

In Cyathus the peridium is cuplike and composed of three layers. The apex is covered by a white membrane, which bursts, disclosing egglike bodies, the peridiola, which usually fill about one-half of the cup. The peridiola are attached to the inner wall of the peridium by an elastic cord, which is attached to each peridiolum in a depression on one side.

Cyathus stercoreus.

Peridium cylindrical, campanulate to infundibuliform, sessile or with an elongated base, light brownish, at first with shaggy, matted hairs which disappear in age, interior smooth and nonstriate; peridiola black.

Cyathus stercoreus is an exceedingly common species and is to be found growing on manure or in heavily manured places. It is subject to considerable variation in size and form.

Cyathus striatus.

Peridium obconic, exterior even, brownish, hairy, interior striate, lead colored; apex truncate, covered by a white membrane, which is at first strigose; peridiola compressed, subcircular.

Plant one-half to three-fourths inch in height and about three-eighths inch in diameter.

Cyathus vernicosus.

Peridium bell shaped, subsessile, base narrow, broadly open above, exterior at first brownish, silky tomentose, becoming smooth, interior dull lead color, smooth. Differs from *Cyathus striatus* in the even, nonfluted inner surface of the peridium and in the larger peridiola.

Plant about one-half inch in height and about three-eighths inch in diameter.

CRUCIBULUM.

In Crucibulum the peridium is cup shaped and consists of one thick fibrous layer, lined by a very thin, smooth, and shining layer. The mouth when young is covered with a yellowish tomentose membrane, the peridiola are more numerous than in the preceding genus, and each is attached to the peridium by an elastic cord which springs from a projection on the peridiolum. The plants are smaller than in the genus Cyathus.

Crucibulum vulgare.

Peridium yellowish brown, becoming paler with age, outer surface when young velvety tomentose, inner surface smooth and shining; mouth at first closed by a yellowish membrane, which ruptures and exposes the peridiola. Peridiola biconcave, with a projection on one side from which originates the elastic cord which attaches the peridiola to the peridium.

Plant about one-fourth inch in height and about the same in diameter.

ASCOMYCETES.

The character peculiar to all fungi of the class known as Ascomycetes is the production of spores in asci, microscopic saclike bodies instead of gills, tubes, teeth, or other specially modified structures. The genera are subject to great variation in form, size, and consistency. The plants may be spherical, elongated, expanded or cup shaped, sessile or stipitate, microscopic or several inches in size, waxy or gelatinous, hard or soft, elastic or rigid. The genera described here may be identified by the assistance of the accompanying key, which does not require a consideration of microscopic characters.

Key to Ascomycetes.

Plants cup shaped to disk shaped, gelatinous, fleshy:
  Substipitate, closed at first, large, exterior rough, interior gelatinous-pulpy.....BULGARIA.
Plants stipitate, hymenophore clavate, globose or conical, deeply folded and pitted.....MORCHELLA.
Plants stipitate, hymenophore irregular or lobed, with conspicuous brain-like convolutions, hollow.....GYROMITRA.
Plants capitate, stem cylindrical or laterally compressed, gelatinous-gristly, hymenophore undulated or even.....LEOTIA.
Plants stipitate, urn shaped, leathery, blackish.....URNULA.

BULGARIA.

In the genus Bulgaria the plants are cup shaped, sessile, or substipitate and are either single or gregarious. They are of a pulpy gelatinous consistency when fresh or in wet weather, but horny to cartilaginous when dry. The two species most frequently encountered by the collector are *Bulgaria inquinans* and *B. rufa*, both of which grow on dead branches or fallen twigs.

The cups of *Bulgaria rufa* are subturbinate, at first closed, later concave, the margin wavy when old, hymenium light colored, plants 1 to 2 inches in diameter. *Bulgaria inquinans* may be distinguished from *B. rufa* by the more uniform turbinate caps, dark hymenium, and smaller size. (Pl. XXXVII, fig. 1.)

MORCHELLA.

The genus Morchella is very easily distinguished by the prominently ridged and pitted hymenium (cap), which is hollow and continuous with the cavity of the stem, to which it is adnate throughout its length. The plants are stipitate, waxy, and brittle in consistency, and the caps are conic or cylindrical to ovate.

From early historic times the morels have been considered among the choicest edible fungi.

Morchella esculenta. (Edible.)

The species of most common occurrence is *Morchella esculenta*. The plants are from 2 to 4 inches high and about 1½ to 2 inches broad; the cap is ovate or oblong, deeply pitted, dingy yellow, tawny, or greenish; the stem is 1 to 2 inches long, stout, generally hollow, whitish. This species is of wide and abundant occurrence and is found on the ground, particularly along banks of streams or in sandy localities. (Pl. XXXV, fig. 2.)

GYROMITRA.

The genus Gyromitra is distinguished from Morchella by the thick brainlike folds of the hymenophore, as contrasted with the irregular polygonal depressions or pits in Morchella, and from Helvella by the hymenophore being basally attached to the stem, while in Helvella the cap is always free.

Gyromitra esculenta.

The species is stipitate, the hymenium inflated, gyrose, undulated, hollow, or cavernous, margin attached to the stem, brownish red. This species is generally 2 to 4 inches high and 2 to 3 inches broad, although much larger specimens are often found. The plants appear in May and June and show a preference for a sandy habitat in coniferous woods. They are much more abundant in moist or wet seasons. By many authorities *Gyromitra esculenta* is considered a very excellent edible species, but there are reports of its producing cases of poisoning, and because of the uncertainty we would not class it with the edible species.

LEOTIA.

The interesting little stipitate genus Leotia comprises plants commonly found on rotten wood, moss, along streams or on moist ground, gregarious or in clusters. The cap is irregularly orbicular, supported in the center, and revolute at the margin. Two species, *Leotia chlorocephala* and *L. lubrica,* are of frequent occurrence. Both forms are somewhat gelatinous, but in *L. chlorocephala* the cap is dark green and the stem green and twisted, while in *L. lubrica* the cap is yellowish green and the stem yellow, nearly equal, or inflated at the base and finally hollow. These plants grow from 1½ to 3 inches high. (Pl. XXXVIII, fig. 1; from W. A. Kellerman.)

URNULA.

Urnula craterium.

This species is commonly known as the black-urn fungus, a designation descriptive of its shape. The plants are about 1½ to somewhat over 2 inches in width and 2 to 3 inches in height, dark brown to black, irregularly hemispherical to urn shaped, opening by a stellate rupture, margin incurved, leathery or cheesy in consistency, covered externally with minute black hairs. The stem is stout, sometimes grooved, the same color as the cap, and hairy. Specimens are generally found on half-buried sticks or branches. (Pl. XIII, fig. 2.)

POISONOUS OR SUSPECTED MUSHROOMS.

The following species are poisonous or suspected of being poisonous:

Amanita chlorinosma.
Amanita cothurnata.
Amanita junquillea.
Amanita muscaria.
Amanita pantherina.
Amanita phalloides.
Amanita porphyria.
Amanita radicata.
Amanita solitaria.
Amanita spreta.
Amanita strobiliformis.
Amanita virosa.
Amanitopsis volvata.
Boletus erythropus.
Boletus felleus.
Boletus luridus.
Boletus miniato-olivaceus *var.* sensibilis.
Boletus satanus.
Calvatia cyathiformis.
Cantharellus aurantiacus.
Clathrus columnatus.
Clavaria aurea.
Clitocybe geotropa.
Clitocybe illudens.
Cortinarius purpurascens.
Elaphomyces granulatus.
Entoloma grande.
Entoloma lividum.
Entoloma sinuatum.
Entoloma speculum.
Geaster hygrometricus.
Gyromitra esculenta.
Hebeloma crustuliniforme.
Hebeloma fastibile.
Helvella esculenta.
Hypholoma fasciculare.
Hygrophorus conicus.
Inocybe infelix.
Inocybe infida.
Ithyphallus impudicus.
Lactarius fuliginosus.
Lactarius piperatus.
Lactarius pyrogalus.
Lactarius rufus.
Lactarius theiogalus.
Lactarius torminosus.
Lactarius villereus.
Lactarius zonarius.
Lepiota dolichaula.
Lepiota morgani.
Marasmius peronatus.
Marasmius urens.
Mitrula paludosa.
Panaeolus campanulatus.
Panus papilionaceus.
Panus stypticus.
Pholiota autumnalis.
Pleurotus olearius.
Psilocybe foenisecii.
Russula emetica.
Russula foetens.
Russula fragilis.
Russula nigricans.
Russula nitida.
Russula queletii.
Scleroderma bovista.
Stropharia aeruginosa.
Stropharia semiglobata.
Tricholoma sulphureum.
Tricholoma tigrinum.
Tricholoma venenatum.
Volvaria gloiocephala.

GLOSSARY.

Ad'nate, closely attached, as gills to stipe.

Adnexed', gills reaching the stem but not adnate to it.

Anas'tomosing, united by running together irregularly, as of gills or veins with each other.

An'nulate, having a ring.

An'nulus, the ring on the stem of a mushroom formed by the separation of the veil from the margin of the cap.

A'pex, in mushrooms, the extremity of the stem nearest the gills.

Ap'ical, relating to the apex or top.

Appendic'ulate, having an appendage hanging in small fragments.

Arach'noid, cobweblike.

Are'olate, divided into little areas or patches.

Ascend'ing, rising somewhat obliquely upward or curving.

As'ci, plural of ascus.

Ascomyce'tes, group of fungi in which the spores are produced in saclike cells called asci.

As'cus, microscopic sacklike cell in which spores, generally eight, are developed.

At'omate, sprinkled with minute particles.

Atten'uate, becoming gradually narrowed or smaller.

Ax'is, the central line of growth, stipe, stalk, etc.

Azo'nate, without zones or circular bands of different color.

Basid'ium, an enlarged cell upon which spores are borne.

Basid'iomyce'tes, a group of fungi which has its spores produced upon basidia.

Bifur'cated, divided into two forks or branches.

Bul'bous, applied to stem of a mushroom with bulblike swelling at the base.

Campan'ulate, bell shaped.

Car'nose, fleshy.

Cartilag'inous, gristly, firm, and tough.

Cen'timeter (cm.) the hundredth part of a meter, equal to 0.3937 of an inch.

Ces'pitose, growing in tufts or clumps.
Cla'vate, club shaped.
Co'mate, hairy.
Coria'ceous, of a leathery texture.
Cor'neous, of a horny texture.
Cor'rugated, having a wrinkled appearance.
Cor'tex, an outer rindlike layer.
Cre'nate, notched at the edge, notches blunt, not sharp as in a serrated edge.
Cu'ticle, skinlike layer on the outer surface of cap and stem.
Cyath'iform, cup shaped.
Decid'uous, falling off at maturity.
Decur'rent, applied to gills which are prolonged down the stem.
Deliques'cent, relating to mushrooms which become liquid.
Den'tate, toothed.
Dimor'phic, existing in two distinct forms.
Dis'coid, disk shaped, of a circular, flat form.
Dis'tant, applied to gills which are not close.
Divar'icate, diverging widely.
Eccen'tric, same as excentric.
Echin'ulate, beset with short bristles.
Emar'ginate, when gills are notched or scooped out at junction with stem.
Excen'tric, not central.
Exoperid'ium, outer layer of the peridium.
Expan'ded, spread out, as the pileus (cap) from convex to plane.
Farina'ceous, mealy.
Far'inose, covered with a white, mealy powder.
Fi'brillose, appearing to be covered or composed of minute fibers.
Fi'brous, clothed with small fibers.
Fim'briate, fringed.
Fis'sured, cleft or split.
Flabel'liform, fan shaped.
Floc'cose, downy, woolly.
Fo'veolate, marked with minute pits or depressions.
Free, said of gills not attached to the stem.
Fur'cate, forked.
Gibbous, swollen at one side.
Gla'brous, smooth.
Gleba, spore-bearing tissue in Gastromycetes.
Gran'ular, covered with or composed of granules.
Grega'rious, growing together in numbers in the same locality.
Gut'tula, a small drop or droplike particle.
Hab'itat, natural place of growth of a plant.
Hirsute', hairy with stiff hairs.
Hoar'y, covered with short, dense, grayish-white hairs.
Hygromet'ric, readily absorbing and retaining moisture.
Hygroph'anous, watery when moist, opaque when dry.
Hyme'nium, the fruit-bearing surface.
Im'bricate, overlapping like shingles.
Immar'ginate, without a well-defined margin.
Incised', having marginal slits or notches.
Indu'sium, in phalloids, a veil hanging beneath the pileus (cap).
Inflexed', bent inward.
Infundib'uliform, funnel shaped.
In'nate, adhering by growth.
In'volute, rolled inward.
Lac'cate, as if varnished or coated with wax.
Lacin'iate, cut into jagged edges.
Lan'ceolate, tapering to both ends.
La'tex, thick, milky juice.
Lactif'erous, applied to tubes containing latex.
Line, one-twelfth of an inch.
Mac'ulate, spotted.
Mar'ginate, having a well-defined border.
Ma'trix, the substance upon or in which a fungus grows.
Mi'cron, one one-thousandth of a millimeter, represented by the Greek letter mu (μ) following the number.
Mil'limeter (mm.) the thousandth part of a meter, nearly one twenty-fifth of an inch; 25.4 mm. = 1 inch.
Mu'ricate, rough, with short, hard points.
Obo'vate, broad end upward or toward the apex.
Paraph'yses, slender threadlike structures growing with the asci.
Par'tial, said of a veil clothing the stem and reaching to the edge of the cap but not extending beyond it.
Pec'tinate, toothed like a comb.

Pel'licle, a thin skin.
Perid'ium, the coat of certain plants, as for example, puffballs; may be single or double.
Pi'leate, having a cap or pileus.
Pi'leus, cap of a fungus.
Pi'lose, covered with hairs; furry.
Pli'cate, folded like a fan.
Pi'lei, plural of pileus.
Plane, applied to gills with even edge.
Plu'mose, feathery.
Po'roid, porelike.
Pru'inose, covered with a bloom or powder.
Pubes'cent, covered with soft, short hairs, downy.
Pul'vinate, cushion shaped.
Punc'tate, dotted with points.
Reflexed', turned back.
Resu'pinate, attached to the matrix by the back, the hymenium facing outward.
Retic'ulate, marked with cross lines like the meshes of a net.
Rev'olute, rolled backward or upward.
Rhi'zomorphs, long, branching or anastomosing, rootlike cords of mycelium produced by many fungi.
Rim'ulose, covered with little cracks.
Ring, annulus, a part of the veil adhering in the form of a ring to the stem of an agaric.
Ri'vose, marked with furrows which do not run in parallel directions.
Ru'gose, wrinkled.
Sap'id, agreeable to the taste.
Sca'brous, rough on the surface.
Sca'riose, thin, dry, membranaceous; applied to a shriveled membrane.
Sclero'tium, a hard, compact mass of mycelium, the resting stage of certain fungi.
Scrobic'ulate, marked with small pits.
Se'riate, arranged in rows.
Seri'ceous, silky.
Ser'rate, saw toothed.
Se'tose, bristly.
Sin'uate, wavy, as the margin of gills.
Si'nus, a rounded inward curve.
Spor'ophore, the fruiting body of a fungus.
Squa'mous, covered with appressed scales.
Stipe, stem of a mushroom.
Stri'ate, marked with parallel or radiating lines.
Stri'gose, rough with stiff hairs.
Stuffed, said of a stem filled with material of a different texture from its walls.
Sul'cate, grooved, marked with furrows.
Tes'sellated, checkered in a regular manner.
Tomen'tose, densely pubescent with matted wool.
Trun'cate, cut squarely off.
Tu'bercle, wartlike excrescence.
Tur'binate, top shaped; an inverted cone.
Umbil'icate, with a central depression.
Um'bo, central elevation.
Un'cinate, hooked; forming a hook.
Un'dulate, wavy.
Univer'sal, said of the veil or volva which entirely envelopes the fungus when young.
Vag'inate, sheathed.
Ve'nate, veined, intersected by swollen wrinkles below and on the sides.
Ven'tricose, swollen in the middle.
Ver'nicose, appearing as if varnished.
Vil'lose, covered with long, weak hairs.
Vis'cid, moist and sticky.
Vis'cous, gluey.
Zo'nate, marked with concentric bands of color.

RECIPES FOR COOKING MUSHROOMS.

According to the views of many persons, mushrooms are best cooked simply, with butter, pepper, and salt only for seasoning. The addition of various condiments impairs the delicate mushroom flavor. However, tastes vary, and the opportunity of choice or experiment is herewith rendered available by selections which may be made from the recipes which follow. All have been either tried

by the writers or selected from the printed directions of capable authorities.

The general statement can be made that mushrooms may be prepared for the table in any way which would be suitable for oysters.

The caps should be carefully washed, gill side down; peeling may be required to remove adherent foreign matter, but otherwise it is unnecessary and involves a considerable waste of time and loss of flavor. Unless they are extremely tough, the stems should not be discarded, but cut into small bits and stewed, or, after long boiling, even if tough, run through a sieve and made into a soup or sauce.

Wild mushrooms should be cooked soon after collection, as they are in that way much better preserved than if kept uncooked, even in a refrigerator.

Some thin, juicy, wild varieties, as species of Coprinus, may require cooking but 5 to 10 minutes, while thicker, tough plants may require 30 to 40 minutes, and some mushrooms which never become tender by stewing may be excellent if fried. Judgment, a most essential qualification for a good cook, will usually assist in the selection of a method suited to the species in hand and in deciding the length of time necessary for its cooking.

Deviled Mushrooms.

Chop or break into small pieces 1 quart of mushrooms seasoned with pepper and salt; prepare 1 pint of bread crumbs; mix the mashed yolks of 2 hard-boiled eggs with 2 raw ones and stir into 1 cup of milk or cream. Put a layer of crumbs in the bottom of a baking pan or dish, then a layer of mushrooms, scatter over bits of butter, pour on a part of the cream and egg mixture, and continue until the dish is full, having bread crumbs with butter for the top layer. Closely covered, bake 20 minutes in a hot oven; then uncover for about 5 minutes, or sufficiently long for the top to be well browned. If preferred, water and lemon juice may be substituted for milk or cream.

Fried Mushrooms.

Beat the yolk of an egg with a tablespoonful of water, and season with pepper and salt. In this, dip each cap and then dip into fine cracker crumbs or corn meal. Have butter or cooking oil very hot in a frying pan. Fry slowly on each side 5 minutes. A sauce can be made by thickening the butter or oil with flour and adding milk or cream. If desired, serve on toast. A smooth, thin tomato sauce is also excellent.

Fricasseed Mushrooms.

Peel and remove the stems from large mushrooms. Make a forcemeat by chopping the white meat of a cold roast chicken fine with a few small mushrooms and moistening it with chicken stock. Grease a pudding dish and lay the large mushrooms, tops down, in this. Fill the mushrooms and the space between them with the forcemeat. Sprinkle bits of butter over all. Pour in enough of the chicken stock to make the contents of the dish very moist, lay a few waferlike slices of bacon on top of the scallop, and bake, covered, in a hot oven for 15 minutes; uncover, and cook for 5 minutes longer. Serve in the dish in which they were cooked. (*Marion Harland's Cookbook, p. 460.*)

Baked Mushrooms.

Peel and stem large mushrooms. Line a deep baking dish with thin slices of toast, each of which has been dipped for an instant in seasoned beef stock. Fill the dish with layers of mushrooms, sprinkling each layer with salt, paprika, and bits of butter. When the dish is full, pour over all a gill of stock, and bake, covered, for 20 minutes; uncover, and cook for 5 minutes before sending to the table. (*Marion Harland's Cookbook, p. 213.*)

Broiled Sweetbreads with Mushrooms.

Blanch the sweetbreads and cut them in half, lengthwise. Grease a small gridiron, lay the split sweetbreads on this, and broil over a clear fire, turning frequently and watching carefully lest they scorch. When done, lay on rounds of crustless toast, rub thoroughly with butter; salt and pepper to taste and cover with minced mushrooms fried in butter. (*Marion Harland's Cookbook, p. 121.*)

Oysters with Mushrooms.

Drain about 25 oysters, put them into a hot pan with a teaspoonful of butter and toss them until they are plumped and ruffled on both sides. Then place them in a hot dish. To the oyster liquor add the juice of half a pint of chopped mushrooms and enough milk to make a pint. Thicken this with a tablespoonful of flour moistened with a little milk and cook 3 minutes; stir in the mushrooms and cook 2 minutes longer; add a half teaspoonful of salt, a half teaspoonful of lemon juice, a teaspoonful of onion juice, the beaten yolks of 2 eggs, and a heaping tablespoonful of butter. Put in the oysters and as soon as the preparation reaches the boiling point turn into a hot dish. (*Marion Harland's Cookbook, p. 150.*)

Mushrooms with Bacon.

Fry the bacon, and on removing it from the frying pan keep hot; cook the mushrooms on each side in the "frying"; serve on a platter with the strips of bacon arranged as a border.

Several species are good prepared in this manner, but it is one especially well suited to *Agaricus campestris*.

Mushrooms Baked with Tomatoes.

In a baking dish arrange small round slices of buttered toast; upon each piece place a rather thin slice of peeled tomato, salted and peppered; upon each slice of tomato place a fine, thick mushroom, gill side up; in the center of each mushroom put a generous piece of butter; season with pepper and salt. Cover the dish and bake in a hot oven 10 minutes; then uncover and bake for an additional 5 to 10 minutes, as the mushrooms appear to require.

Peppers Stuffed with Mushrooms.

Cut the stem end of the peppers and carefully remove all seeds and the white membrane; chop or break the mushrooms into small pieces, season with pepper and salt, press firmly into the peppers, and put a good-sized lump of butter on top of each. The water adhering to the mushrooms after washing will furnish sufficient moisture for their cooking. Arrange the peppers on end in a baking dish, having water with salt, pepper, and butter poured into the depth of about an inch. Place the dish in a hot oven, cook covered 15 minutes; then uncover and baste and cook for 10 to 15 minutes longer, or until the peppers are perfectly tender. An addition of chopped cooked chicken or veal to the mushrooms is a pleasing variation.

Mushrooms and Cheese.

Butter a baking dish, place in layers mushrooms broken in small pieces, bread crumbs, grated cheese, salt, pepper, and bits of butter; continue until dish is filled, letting the top layer be a thin sprinkling of cheese. Cover and cook in oven for 20 minutes; remove cover for 5 minutes before serving.

Mushrooms à la Poulette.

Stew the mushrooms in cream; remove from the fire and stir in the beaten yolks of two eggs. Return to the fire to let the eggs thicken; then serve at once. (*Helen Cramp. Universal Cookbook*, p. 172.)

Mushroom Pie.

Various species are good prepared in the form of pie. Ordinary pastry crust may be used or a rich biscuit dough is well adapted for the purpose. The mushrooms should be previously stewed, and to the liquor should be added milk or cream, a little thickening, butter, pepper, and salt.

Cream of Mushroom Soup.

Stew caps and stems cut in small pieces for an hour or longer; run through a colander, add cream or milk, thicken with flour, add butter, salt, and pepper. Pour in bouillon cups and serve with whipped cream on top.

Salads.

For salads many mushrooms can be used raw (after being peeled), especially species of Coprinus and Clavaria and all puffballs. Tougher plants can be stewed, drained, and chilled before adding the dressing, which may be either a mayonnaise or French dressing of oil with vinegar or lemon juice. Serve on lettuce.

Mushroom Patties.

Cut the mushrooms into small pieces, cook slowly in butter until tender, add cream or milk, pepper, and salt, and thicken with flour. Fill the reheated patty shells.

Under the Glass Cover, or Bell, with Cream.

With a small biscuit cutter, cut rounds from slices of bread; they should be about 2½ inches in diameter and about half an inch in thickness. Cut the stems close to the gills from fresh mushrooms; wash and wipe the mushrooms. Put a tablespoonful of butter in a saucepan; when hot, throw in the mushrooms, skin side down; cook just a moment, and sprinkle with salt and pepper. After the rounds of bread have been slightly toasted, arrange them in the bottom of a bell dish and heap the mushrooms on them; put a little piece of butter in the center; cover over the bell, which is either of glass, china, or silver; stand them in a baking pan, and then in the oven for 20 minutes. While these are cooking, mix a tablespoonful of butter and one of flour in a saucepan, add either a half pint of milk or a gill of milk and a gill of chicken stock; stir until it boils, then add a half teaspoonful of salt and a dash of pepper. When the mushrooms have been in the oven the allotted time, bring them out; lift the cover, pour over quickly a little of this sauce, cover again, and send them at once to the table.

Mushrooms in Paper Bags.

Cut the stems close, sprinkle lightly with salt, and lay in a well-greased bag together with a big teaspoonful of butter rolled in flour and half a cupful of rich cream. Seal and cook 12 minutes in a hot oven. (*Emma Paddock Telford. Standard Paper-Bag Cookery, p. 93.*)

Suggestions for Certain Species.

armillaria mellea.

While not one of the best edible species, it is excellent fried and served on toast and also is quite good stewed.

cantharellus cibarius (chanterelle stew).

This mushroom, being of rather tough consistency, requires long and slow cooking.

"Cut the mushrooms across and remove the stems; put them into a closely covered saucepan, with a little fresh butter, and sweat them until tender at the lowest possible temperature. A great heat always destroys the flavor."—*Mrs. Hussey.* (*W. Hamilton Gibson. Our Edible Toadstools and Mushrooms and How to Distinguish Them, p. 310.*)

coprinus.

Species of Coprinus are very delicate, and *Coprinus micaceus* is considered the most digestible of all mushrooms. They are good steamed 5 minutes and served with butter and white sauce.

Species of Coprinus are also delicious baked with cheese. Butter a baking dish and put in a layer of mushrooms, bread crumbs, cheese grated (or cut in small pieces), and season with pepper and salt. Repeat the process once or twice according to the amount to be prepared, adding a few small lumps of butter to the last layer. Bake 15 to 20 minutes.

FISTULINA HEPATICA.

The beefsteak fungus should be sliced across the grain and soaked in salt water, the length of time varying probably with its age. The slices should be wiped dry and broiled or fried, then dressed with butter, salt, and pepper.

The fungus may be used raw for salad, dressed to suit the taste of the collector, stewed, or made into soup. The suggestion of its use as the foundation for a beefsteak pie is apparently worthy of experiment, as the resemblance to a good steak, in flavor if not in texture, is quite remarkable.

MARASMIUS OREADES.

The fairy-ring fungus is especially popular stewed and served with a brown sauce as an accompaniment to beefsteak. The species dries easily and even those dried naturally in the open may be revived by soaking and prepared for the table.

Fairy-ring pickles can be made after being packed in jars by having highly spiced vinegar heated to the scalding point poured over them. They are ready for the table in about two weeks.

MORCHELLA ESCULENTA.

All morels are delicious. Probably the best manner of preparing them is stuffed with a force meat made of chopped cooked chicken or veal, with moistened bread or cracker crumbs seasoned simply with salt and pepper. The stalks should be split to permit the stuffing, and then tied together before the morels are baked. In the covered baking dish there should be a very small quantity of water.

PLEUROTUS OSTREATUS (MOCK OYSTERS).

Take small specimens of *Pleurotus ostreatus* or cut from large tender ones pieces the size and shape of oysters. Dip them in the beaten yolk of an egg to which a tablespoonful of water has been added, and roll in cracker crumbs or corn meal. Season with salt and pepper. Fry in either deep fat, melted butter, or oil.

PUFFBALLS.

Never use puffballs unless the inner part is perfectly white when sliced. They should be peeled and can then be dressed raw for a salad, stewed with cream, and served either in patty shells, or on toast, or fried. When fried simply in melted butter or oil, they are fine; or the slices may be dipped in egg and cracker meal before being placed in the frying pan. A cream dressing is a delicious addition to fried puffballs.

TRICHOLOMA EQUESTRE.

This species is most excellent fried; also creamed and served as patties. A unique way of serving it is in a soup made with water, pepper, and salt, which will deceive any person into believing he is enjoying a dish of extremely fine turkey broth. After straining—for it must be a clear soup—add a small amount of butter.

TRICHOLOMA TERREUM.

Fine for patties and makes a most excellent soup, especially if celery is boiled with the chopped mushrooms; strain, and add butter, pepper, and salt.

Preserving Wild Mushrooms.

Requests for instructions in regard to canning mushrooms are frequently received. The following directions, compiled by the Office of Experiment Stations from Bulletin No. 98 of the Oregon Agricultural Experiment Station, describe methods of canning and drying alike applicable to cultivated or wild species. The author, E. F. Pernot, states that mushrooms "may be canned as easily as fruit and much easier than some vegetables."

The buttons ranging in size from the smallest to those with the cup breaking from the stem are the most desirable for canning, as they remain firm and white after being heated. When sufficient buttons are gathered they are cleaned by peeling or by wiping with a cloth, removing any soiled spots or earth which may have adhered to them. The stems are cut off, leaving from one-half to 1 inch attached to the cap. They may then be placed in a granite-iron kettle and heated without water until

shrinkage ceases, after which they are placed in cans that have previously been cleaned and scalded, and the liquor poured over them, completely filling the can.

If glass cans are used, after filling they are placed in any kind of vessel provided with a cover and containing a small quantity of hot water. A sheet of asbestos or a thin layer of excelsior is placed in the boiler to prevent the glass from coming in contact with the bottom. The caps are placed loosely on the cans and with steamer cover in place the water allowed to simmer for half an hour. Upon removing the cover from the steamer the can covers are immediately screwed down as tightly as possible; then the cans are put away to cool, upside down , in order to detect any leak. If all are perfectly sealed, allow them to stand until the next day at the same time, when they are again heated in the same manner, except that the time must be prolonged to one hour, because the contents of the cans are cold. Again the third day repeat this operation, which will complete the sterilization, and the mushrooms will be found to be as nearly like the fresh article as it is possible to have them. They keep well and do not deteriorate either in consistency or in flavor. The cans must be kept sealed throughout the operation.

If desired, the mushrooms may be stewed in milk or prepared in any manner for the table and then canned in the manner described. When the can is opened they require heating only before serving.

When tin cans are used they are handled in the same manner as glass ones, except that the lid should be soldered as soon as the can is filled, leaving the vent open until after heating the first time; then the vent should be immediately closed with a drop of solder while the can is hot, thus forming a partial vacuum that takes up the expansion caused by subsequent heatings.

Mushrooms in Oil.

After boiling for about 10 minutes, drain and pack the mushrooms in a jar, filling it with melted butter or oil. Seal and keep in a cool place.

Although this method seems expensive it in reality is not, because if the mushrooms are tightly packed the butter used will simply furnish the amount required for seasoning in their final preparation for the table.

Mushroom Catsup.

One pint mushroom liquor.
One-half ounce peppercorns.
One-fourth ounce allspice.
One-fourth ounce green ginger root.
One-fourth ounce cloves.
One blade mace; salt.

Wash and look over the mushrooms carefully; put them in an earthen jar with alternate layers of salt. Let stand for 24 hours in a comparatively warm place; put through a fruit press and add the ginger root cut into small pieces. Measure the liquor; add peppercorns and simmer for 40 minutes; then add the spices and boil for 15 minutes. Take from the fire and cool; strain through a cloth, bottle, and seal. (*Helen Cramp. Universal Cookbook, p. 387.*)

Place mushrooms in an earthen jar and sprinkle salt over them, stirring so that all receive the salt; allow them to stand for 12 hours; then mash and strain through a cloth. For every quart of the liquid add half a teaspoonful of ground ginger and half a teaspoonful of black pepper. Boil the liquid in a granite-iron kettle until it is reduced not less than one-third. Prepare the bottles by cleaning and thoroughly boiling them and their corks; then fill to the neck with hot catsup, cork tightly, and when the cork has dried and before they are cold, dip the cork and about half an inch of the bottle neck into hot canning wax, previously melted in a cup or can. It is advisable to use rather small-sized bottles, so that the contents may be used before remaining open too long. (*E. F. Pernot, Oregon Agricultural Experiment Station, Bulletin No. 98.*)

Dried Mushrooms.

A good use to make of the older mushrooms is to dry them. This may be done after they have been peeled or cleaned by placing them upon boards or drying racks, only one deep, and exposing them to the sun and air. Beginning with the cap side down, they should be turned over every day and must not be left out during the night, as they absorb moisture very rapidly. They may also be dried upon wooden trays in a warm room. When dried by either method until they feel dry to the touch finish them in the oven and while brittle grind them into a fine powder with a spice mill, or even a coffee mill will answer the purpose. The powder should at once be placed in well-stoppered, dry bottles, or fruit jars well sealed, and kept in a warm,

dry place. Mushrooms that are wet can not be successfully dried. The best are those which grow and are gathered dry.

Mushroom powder keeps very well, and it is one of the most delicious flavoring condiments of the kitchen. If milk is used in making meat gravy or other dishes the flavor is much more pronounced.

The mushrooms may also be dried in the manner described, and used whole by first soaking them before preparing the various dishes; they are practically the same as fresh ones, with the exception of being somewhat tough. The flavor is fully as strong as in fresh ones. (*E. F. Pernot, Oregon Agricultural Experiment Station, Bulletin No. 98.*)

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